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FUNDAMENTALS OF INDUSTRIAL ADMINISTRATION

AN INTRODUCTION TO MANAGEMENT

VOLUME II

To meet Part B of the current Syllabus on *Fundamentals of Industrial Administration*, covering the :—

Elements of: Industrial Law; Organisation for production, distribution and development; The human factor and industrial relations; General principles of management and the division of functions.

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FUNDAMENTALS OF INDUSTRIAL ADMINISTRATION

AN INTRODUCTION TO MANAGEMENT

BY (THE LATE)
EDWARD TREGASKISS ELBOURNE

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NEW REVISED EDITION IN TWO VOLUMES

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A.C.A., F.I.I.A., F.C.W.A.

VOLUME II

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1949

THIS BOOK WAS DEDICATED
TO THE
INSTITUTE OF INDUSTRIAL ADMINISTRATION
BY THE LATE
EDWARD TREGASKISS ELBOURNE
THROUGH WHOSE INITIATIVE AND FORESIGHT
THE INSTITUTE WAS FOUNDED IN 1920

“There are pioneer souls that blaze their paths where highways never ran,” and he was one. Completely un-selfseeking, dominated by a dynamic sense of mission, that rendered him impervious to all discouragement and unresponsiveness, and he encountered plenty, he sacrificed both himself and his personal interests in promulgating the basic truths of management. When Mr. Valiant-for-Truth passed over the river you remember how, Bunyan said, “all the trumpets sounded for him on the other side.” I often think they must have sounded loudly for EDWARD ELBOURNE.

SIR LYNDEN MACASSEY, K.B.E., LL.D., D.Sc.
in an Address on *Management and the Community*
at an I.I.A. Conference on *Management and Society*.
April, 1944.

PREFACE TO THE FOURTH EDITION

THE sombre history of the period beginning August 1914, and ended thirty-one years later, closed on a note of mingled suspense and hope. Resulting from two world wars, our nation has parted with the greater part of its external investments, largely ceased to be a creditor and become a debtor country, lost temporarily much of its former world trade, and is challenged for the trade it formerly enjoyed by powerful rivals whose inventive ability, industrial development, and productive capacity have been immensely stimulated by the common effort which they shared with us in resisting aggression. Later competitors will be ex-enemy nations whose industrial potential will not so long hence have to be seriously reckoned with.

Though, under the stimulus of the armed struggle for existence, our technical progress and achievements did not suffer by comparison with other nations, our efforts towards recovery and expansion will have to be pitted ere long against those of all our powerful industrial rivals, ex-ally and ex-enemy alike, in an intensive struggle to regain and retain that measure of world trade on which our prosperity, and indeed our existence as a great nation, must depend.

For a comparatively short period there is likely to be a sellers' market while shortage of consumer goods everywhere needs to be made good and requirements from vast areas of devastation in so many countries clamour to be satisfied; but later there will develop a buyers' market in which the choice will lie with the customer; and in the latter stage, which may prove to be permanent, that country in which knowledge of the principles and practice of industrial administration is most highly developed will be in the best position to compete.

During the second world war, in particular, we have realised as never before the part which enlightened management can play in the improvement of methods of research, design, development, production and distribution. It is now widely accepted

in this country that organised instruction can provide a reliable foundation of knowledge favourable to the development of personality and individual capacity for management; and a large measure of professional agreement has been reached as to the quality and scope of the fundamental knowledge which can assist in equipping an aspirant to industrial leadership in the post-war world for the effective discharge of his or her responsibilities.

Beginning in 1934, Technical Institutions throughout Great Britain have given to many thousand students of the subject "Fundamentals of Industrial Administration" instruction through which they have been led to a sound elementary understanding of the place of industry in the world of affairs, the controlling influences under which it operates, and the functions involved in its management.

The text of the first edition of this book, published in 1934—of which the greater part is incorporated in the present edition—was prepared in collaboration with a number of experts by the late Edward Tregaskiss Elbourne, founder of the Institute of Industrial Administration, to which Institute and to the cause of education for management which is its prime concern, and of which he was the outstanding pioneer in Great Britain, he contributed enlightened, understanding, tireless effort and selfless devotion until his untimely death in 1935.

Ten years' experience of working to the first syllabus has enabled the Institute of Industrial Administration to simplify and rearrange the original lay-out, and thus to facilitate both the work of Technical Institutions in giving instruction in the subject and the task of the student in grasping it, and so the more effectively to serve the Institute's primary purpose. In brief, that purpose is to give to the student a reliable and comprehensive but necessarily elementary view—broad, informative and helpful, though, being introductory, neither deep nor exhaustive—of commercial and industrial activity in their administrative aspects.

Through the initial wide outlook of such an introduction the student will be the better enabled to ascertain to which of the many fields of activity he feels attracted, and consequently to define his first objective, to plan his career, and, thus prepared, to approach with clearer understanding the more specialised knowledge which he will need subsequently to acquire by study, observation, and experience in his selected field.

Generally speaking, the effect of a study of this subject may be likened to looking at a landscape through the wrong end of a telescope; the diversified fields of industry and commerce with their salient features are brought into correct focus, but in miniature. By keeping this simile in mind, the student is in a position to correlate the thousand-and-one manifestations of the management function that he will meet as he pursues his career. The clearer perception and greater confidence so acquired may be expected to enlarge his understanding, and so to give a measure of direction and strength to the development of his personality, upon which his success as a manager will ultimately depend.

The content of the subject "Fundamentals of Industrial Administration" is valuable alike to the student who intends to complete, at a later stage, the further studies requisite for the Intermediate and Higher Certificates in Industrial Administration, and to him who intends to pursue a specialist career in, *e.g.*, personnel administration, marketing and distribution, production management, accountancy, banking, insurance, secretaryship or office management. Other preliminary studies, in which it is not essential that every student of industrial administration should become expert, but of which reasonable knowledge will stand him in good stead, are those of accounting, statistical method, and the correct use of our English speech, particularly as written, but also as spoken.

Retention of statistical information used in the Third Edition has been preferred to substitution of figures which, though more recent, reflect special features of this country's tremendous effort in the war and immediate pre-war periods which would preclude normal comparison.

As the author of *Fundamentals of Industrial Administration* had the benefit of advice and help from friends with high administrative experience, so too has the editor of the present revised and renamed edition received similar assistance. In particular his thanks are due to the Controller of H.M. Stationery Office for permission to reproduce the official publication *Scientific Research and Development* (Cmd. 6514), to the Institute of Industrial Administration for permission to use much of their published material, particularly in the Introduction to Vol. I, in the Appendices to Vols. I and II, and in Chapter

VII of Vol. II, and to Messrs. Robert Appleby, F.I.I.A., M.I.P.E., A. W. McIntosh, M.A., M.I.I.A., W. L. Morgan, F.C.I.S., F.I.I.A., F.L.A.A. and O. W. Standingford, F.I.I.A., for their able and authoritative contributions.

A general acknowledgement is made to those authors and publishers (the subject of a Bibliographical Index) whose works have been sampled by quotation,* in order to indicate to some extent the valuable material at the disposal of the student. Every endeavour has been made to give acknowledgement wherever it is due, and regret is expressed if any failure in this connection has occurred. Acknowledgement is due also to the librarians of the American Library (London), the Institute of Chartered Accountants, the Institution of Mechanical Engineers, the Management Library, and the Royal Statistical Society for their unfailing help.

It is hoped that the book in its present form will assist the student to obtain a thorough preliminary understanding of the subject, to lay a reliable foundation on which to build his reading of other and more advanced works on specific aspects of industry and commerce, and to appreciate their true relation to industrial administration as a whole.

H. McFARLAND DAVIS

London, August, 1946.

* Reference to the *Bibliographical Index* is given in the text by raised numbers (e.g. ²⁰ on page 2).

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INTRODUCTION

PHASES OF ADMINISTRATIVE SCIENCE

Without venturing on an historical analysis of the development of administrative science, it may be worth while to draw attention to its three outstanding phases which are familiar, and to contemporary indications of its possible trend.

Past—Traditional. (The beginning of this phase synchronises, obviously, with the beginning of industry. It might well be described as the rule-of-thumb phase, in which the development of practice was inevitably very slow. Change was abhorrent because of ignorance of the reasons for current practice, except that it served at that time as it had in the past, and appeared to be associated with success. So long as a business made a profit, all administrative practice, as far as it was recognised, was accepted as correct. When a business failed, administration was seldom criticised, because its potentialities for good or ill were not understood, and there were no means of testing its effectiveness. Methods both primitive and traditional were passed on from one generation to another with little amendment.)

The essential defects of this attitude are that faults are repeated ignorantly and thoughtlessly, and the opportunities for progress are less. The young man imitates his father, and for the sake of a quiet life sacrifices his birthright of a new outlook.

The defence of the traditional attitude is that it represents experience. Admitting this, it may not have been the best possible experience at the time and, even if it were, experience without development means stagnation. Of course it does not follow that measurable progress is at all times possible in every direction. We do not expect to be able to walk better than our forefathers, though we are acquiring better constitutions, and walk with more comfort, if and when we walk at all.

To keep to the illustration of walking, the traditional method can hardly be improved upon, because the controlling conditions remain essentially the same. If business conditions

to-day were identical with those obtaining fifty years ago, the traditional method in administration might have some justification; but, as it is, to insist on following to-day some method that served, however well, under substantially different conditions, is unwise to say the least, and may easily prove ruinous.

Present—Systematic. The coming of this phase of administrative science can be traced probably to two causes :

The invasion from the U.S.A. of office equipment and appliances, and therefore of highly organised advocacy of systems requiring their use ; and

The high degree of development of English accountancy under the influence of Company Law.)

The accountancy influence has been mainly on the financial side and, perhaps, has not yet fully adapted itself to the further requirements of administration.

There has indeed developed within recent years a separate profession of cost accountancy which may be described as accountancy applied to administrative records, and outside the more strictly limited field of financial accounts requisite for company and, in particular, statutory requirements.

The unavoidable limitations of an accountancy training regarding technical industrial matters have forced the development of systematic recording as a means of non-technical control.

The technician has usually felt that the making of non-technical records was outside his sphere, and has failed to realise that what he ought to have done was to have organised and settled the form of records, leaving to others the keeping of them. In industry even purely financial records can usually only be adequately interpreted in terms of industrial policy by the technically trained mind ; how much more so is it, then, with administrative records that are an attempt virtually to express technical activities in economic terms, whether of material, time or money ?

It is, however, easy for complacency to spread its deadening influence over progressive management, and for systems to be persisted in that fall short of meeting competitive requirements. Systems create vested interests, and, while their adoption was originally an effort to get away from the traditional method,

—especially to substitute the written for the unwritten record—it can acquire the faults of the traditional method by “resting on its oars,” and failing to serve as a stimulus to greater efficiency, in which case it may even seriously hinder the development of business.

There has been, therefore, of late years, a very proper reaction against systems as such, and mostly in that home of systems, the U.S.A., where mass production policy has tolerated the excessive growth of systems without too disastrous an economic effect. When systems have insufficient administrative inspiration, they may be little better in effect than the traditional method, yet cost a good deal more.

Present—Analytical. Within the last generation there has been widespread acknowledgment of the importance of the analytical method in administration. In the U.S.A. they have elected to call it Scientific Management, which is an excellent name if it is interpreted as the Scientific Method in Management, but not when it is thought of as the last word in management.

The founder of the American Scientific Management School, F. W. Taylor, applied analytical method to workshop processes, varying from shovelling iron ore to cutting metals. He dissected every process into its constituent operations and examined minutely how each might be most effectively performed. In shovelling iron ore, for example, he found that the use of a smaller and differently shaped shovel, with organised rest periods, or pauses, resulted in a much greater output per hour with less fatigue.

There is a school of thought in this country which includes this approach to greater efficiency in Industrial Psychology. Certainly the mind controls the muscle, and under nearly all conditions has been found to be the first to show fatigue; so that attention to psychology, the science of the mind, is as important as attention to physiology, the science of the body. Every endeavour to correlate the mind and the industrial process is to be encouraged, as an essential factor in any analytical method worthy of the name.

It is obviously difficult to say definitely whether Great Britain has lagged behind the U.S.A. or any other country in the practice of the analytical method; but certainly (and naturally) much more has been written in the U.S.A. to expound and

develop the science of management in regard not only to production, but also to distribution and budgetary control. Much of this writing is of high value.

In this country * the analytical method was applied in Portsmouth Dockyard about a century and a half ago, but was not publicised and did not become a vogue. Partly because of the smaller scale on which industry is conducted here, partly due to the traditions associated with Great Britain's industrial pre-eminence at and long after the Industrial Revolution, and partly resulting from innate conservatism, British literature of management was sparse and somewhat diffuse until the beginning of the first world war. Since then it has grown in volume, scope, and employment of scientific method, and has become extensive and authoritative.

As an illustration of the wide point of view now taken by some writers on administration, the following remarks of E. S. Byng ⁵⁰ may be quoted: "Administration enters into every kind of co-operative activity. The accompanying diagram (Fig. 1) classifies the main organisations which go to form the complex structure of modern society, and from an analytical study of it, bringing out the similarity of method underlying the diversities of functions, two conclusions may be drawn: (1) that administration is an integral factor in all cases, and (2) that the basic principles of administration are of general application." In this connection the student is referred to L. Urwick's ⁶⁹ diagram of the Function of General Administration, in which is shown the relation of many of the organisations listed in Fig. 1 to the functions of Production, Distribution, Control (including Finance), Labour, Agriculture, and Education, with additional panels for Administration and for Economic and Employers' Associations.

It is now evident that through all highly industrialised countries a strong tide of management is running. Three examples may be given:—

Example 1. The great Russian experiment on a continental scale in which, willy nilly and in disproof of political dogma,

* To England is to be credited the first application, in 1800, to mechanical appliances of the principles of standardisation and mass production. The first well-known contribution to the science of management was *The Economy of Manufactures* by Charles Babbage, the English mathematician. This was published in 1832, and is now out of print.

in less than a generation management by committee was found impossible and single management was proved essential for full effectiveness, is brilliantly outlined by T. G. Rose ⁴⁶ on pp. 340-47.

Example 2. An undertaking, large in itself but on a scale relatively much smaller, in which in the U.S.A. an area about the size of Great Britain, which was rapidly lapsing into ruin, was reclaimed under government authority, is the subject of a book by David Lilienthal ⁵²—*T.V.A., Democracy on the March*, a most valuable management document—in which he says, “Congress adopted and carefully wrote into law * the basic principles and practices of modern management. A federal agency with the broadest of responsibilities was given a full set of the tools that American business has found essential to good management. There have been few pieces of legislation in which so much consideration has been given, through long congressional committee hearings and debates on the floor, to principles of management and the kind of organisation needed to carry out a new national policy.”

Example 3. A Report ⁵⁹ made early in 1937 by a Committee appointed in March 1936 by the President of the United States, to enquire into the condition of administrative management in the Federal Government and to submit recommendations for its improvement. One of his predecessors in that office said that “government is not a mechanical task, but a living organism.” This is well illustrated by the following passage from the Report :—

“The Foundations of Governmental Efficiency.”

“The efficiency of government rests upon two factors : the consent of the governed and good management. In a democracy consent may be achieved readily, though not without some effort, as it is the cornerstone of the constitution. Efficient management in a democracy is a factor of peculiar significance.

“Administrative efficiency † is not merely a matter of paper clips, time clocks, and standardised economies of motion. These are but minor gadgets. Real efficiency goes much deeper down. It must be built into the structure of government just as it is built into a piece of machinery.

* In 1933.

† See Vol. I, p. 222.

“ Fortunately, the foundations of effective management, in public affairs no less than in private, are well known. They have emerged universally wherever men have worked together for some common purpose, whether through the state, the church, the private association or the commercial enterprise. They have been written into constitutions, charters, and articles of association, and exist as habits of work in the daily life of all organised peoples. Stated in simple terms, these canons of efficiency require the establishment of a responsible and effective chief executive as the centre of energy, direction, and effective management; the systematic organisation of all activities in the hands of a qualified personnel under the direction of a chief executive; and to aid him in this the establishment of appropriate managerial and staff agencies. There must also be provision for planning, a complete fiscal system and means for holding the Executive accountable for his programme. ”

“ Taken together, these principles, drawn from the experience of mankind in carrying on large-scale enterprises, may be considered as the first requirement of good management.”

*From “ Report of the President’s Committee on Administrative Management.”*⁵⁹

These examples point the moral that only by eliminating political bias and utilising to the full the principles and techniques of good management and sound administration, can the large schemes of nationalisation now being pressed forward in this and other countries be made to work with full effectiveness, and brought to full fruition, with minimum frustration, delay, muddle and waste.

Future? Dr. James Burnham,¹² after an erudite and wide-ranging argument having a considerable political content, presents his theory of the Managerial Revolution thus: “ In simplified terms, the theory of the managerial revolution asserts merely the following: Modern society has been organised through a certain set of major economic, social, and political institutions which we call capitalist, and has exhibited certain major social beliefs or ideologies. Within this social structure we find that a particular group or class of persons—the capitalists or bourgeoisie—is the dominant or ruling class in the

sense which has been defined. At the present time these institutions and beliefs are undergoing a process of rapid transformation. The conclusion of this period of transformation, to be expected in the comparatively near future, will find society organised through a quite different set of major economic, social, and political institutions and exhibiting quite different major social beliefs or ideologies. Within the new social structure a different social group or class—the managers—will be the dominant or ruling class.”

Sharp controversy has been evoked by this theory. Though opinions differ as to its validity, there is general agreement that it is the duty of every prospective manager to become thoroughly proficient in his chosen profession, so that he may be enabled to discharge even the highest responsibilities with credit to himself and benefit to the community.

CHAPTER I

GROWTH OF INDUSTRIALISATION

The tracing, however briefly, of the growth of individual liberty and material progress in Great Britain reminds the British student that he steps into a heritage built up over the centuries by his own countrymen. At the same time, he must not forget the foreign influences and craftsmanship that have contributed so much to the making of that heritage. Time and effort have welded us into a homogeneous nation with responsibilities and opportunities given to no other country in equal measure. In looking back but a few generations, the student will realise how comparatively little the present age is removed in time from social conditions almost mediæval. The lack of scientific knowledge and the backward state of the public conscience combined, in the early stages of industrial development, to inflict very harsh conditions on the many; while at the same time new opportunities came to the comparatively few to acquire wealth and power. The responsibility of management in industry, in the endeavour to complete the work of eliminating all genuine cause for embittered feelings between employers and employed, becomes increasingly onerous; since, on the one hand, the employer through the diffusion of ownership becomes less a "personality," and, on the other, the employee with the general advance in social thought becomes more informed, more articulate, and more responsible.

THE MIDDLE AGES TO THE EIGHTEENTH CENTURY

A GREAT fascination attaches to the retrospect of the growth of industrialisation, and innumerable books have been written on the subject. The various works consulted disclose certain inconsistencies in dates. Dates of some important events, not chronicled in the text, will be found in the Table of Dates provided at the end of the book. All the dates quoted seem to be reasonably well authenticated.

Space does not permit any consideration of the manorial and feudal systems, under which the livelihood of the lower

classes, or villeins, was obtained by the grant by the lord of the manor of a piece of land, in return for which they were bound to render to the lord certain services, principally in the form of doing every week a certain amount of work on the lord's "demesne." Money wages were not paid the villeins, nor were they allowed to leave the manor. "The lords of the manors became nominally the protectors, but really the masters, of the 'freemen' around them, who were poor and had only a small piece of land." ²⁰ The "freemen" were superior to the villeins, inasmuch as they were relieved of the necessity of doing weekly work on the lord's demesne, and were paid wages if they did so. They paid rent for the land they held, in money or in kind.

It is not correct to say that William the Conqueror imposed the feudal system on England : the system, developed from the manors, was already in existence, and the Norman kings merely organised it into a more rigid form. Domesday Book, William's great survey of his newly-conquered kingdom, apart from its value as a source of information on the manorial system, is of interest, from the point of view of modern statistical research, as being the first census of English "rateable values."

"In that Book, forty-one principal cities or boroughs are mentioned, most of them being the county towns of the present day. There were also ten fortified towns of greater importance than the others (Canterbury, York, Nottingham, Oxford, Hereford, Leicester, Lincoln, Stafford, Chester and Colchester)." ²⁰ London was then, as now, an exceptional town ; and, in addition to being a great port and trading centre, where numerous foreign merchants resided, was even so early the centre of English national life.

Towns, at first, were often only dependent manors which were, for purposes of safety, under the protection of a great noble, a prelate, or the king himself. The transition to a town in the modern sense was marked by the grant of a charter. Other towns, which developed into the market towns, were merely organised communities of traders. All of them were small, though not without a certain standing, and enjoying certain privileges ; but their history as self-governing boroughs may be said to begin in the twelfth century, while not until the fifteenth century did they develop advanced municipal life and organisation.

The conception of war as the highest duty of a manorial lord, then prevalent, led to the granting to towns of many charters, which formed a part of manorial rights, in return for money to enable that duty to be prosecuted to the utmost. It was for the same reason that many of the villeins were allowed to buy their freedom, so that ultimately the serf class disappeared. The Crusades, extravagant adventures, accelerated both processes.

But an internal factor, influencing the growth and emancipation of towns, was the rise of the Gilds Merchant. The chief privileges attaching to membership of a Gild Merchant were a virtual monopoly of the local trade of the town in which it was established, and freedom from certain imposts. With their increasing strength the gildsmen sought from the Crown, or from the lord of the manor, further privileges, such as grants of coinage, the right to hold fairs, and exemption from tolls. Later in time but parallel with the Gilds Merchant were the Craft Gilds, which were associations of masters and journeymen in a particular trade, who generally were considered to be lower in the social scale than the merchants and traders.

It is in these Gilds, Merchant and Craft, that the real beginnings of English commercial development and prosperity may be found. The main objects of the Craft Gilds were to maintain the standard of work produced by their craft or trade, by punishing bad work and suppressing the production of goods by any persons not members of the Gild, and to establish a benevolent fund for members, providing against sickness and death. In most cases, the Gilds exercised a considerable degree of control over their members, and secured their general good behaviour.

An important part of their activities was the apprenticeship system, whereby the future supply of good workmen was secured. It became a rigidly enforced rule that no one could become a member of a Craft Gild without being first apprenticed to a "master" in the trade.

The members of the Merchant and Craft Gilds represent the beginnings of a new social class—one which was ultimately to exert the chief influence on English life—the "middle" class. The feudal aristocracy, whose absolute domination was largely unquestioned, were not concerned with the merchants and traders, except in connection with revenues, and took no

part in the industrial development of the country, which was just stirring into activity. Instead, they reduced their numbers and wealth at the Crusades, and finally destroyed themselves in the Wars of the Roses [1455-85]. These wars were confined to the baronial element and their retainers, and had a negligible effect on the country as a whole, while they were in progress.

As the baronial power declined, that of the towns grew; but this, in turn, reached a point beyond which the old-style municipal life, intensely localised, began to decay. This was about the sixteenth century, when commerce and trade were becoming more and more national, and less local in character. Perhaps the chief service of the old municipal and gild life to our industrial and commercial growth was its supersession of the feudal idea of persons associated in dependence on the superior lord by the idea of personal independence and free association for the purposes of trade.

Although it is in the towns that the origins of industrial growth are found, it should be realised that towns were not yet so numerous or so large as to exert their present dominant influence on the country. Agriculture was the traditional occupation of the nation: the manufacturing industries which were arising in the twelfth and thirteenth centuries were a new phenomenon. The richer villeins and freemen had by now become small farmers, while the poorer sort had become a wage-earning class employed to cultivate the land of others. After the Black Death of 1348-9, in which large numbers of labourers died, labourers' wages rose very rapidly, so much so that the *Statute of Labourers* was passed in 1350 limiting wages. It was extremely unpopular, and was frequently evaded. This statute, coupled with other causes of an economic nature, such as the heavy poll-tax, was largely responsible for the Peasants' Revolt, in 1381. The shortage of labour at this time also had an influence on sheep-farming, which, after the Black Death, increased very considerably. Wool manufactures had increased, so that sheep-farming was rendered more profitable; while the farmers were attracted to it because little paid labour was required. In the sixteenth century, sheep-farming was the cause of a great increase in enclosures of common land by the landlords.

The English woollen industry affords an interesting example of industrial growth. At first the production and export of

the raw wool was the principal feature of the trade—exports going to Flanders (the great wool-manufacturing centre), Holland, and even Florence. There was, however, a coarse weaving industry which flourished all over the country, and was conducted in the cottages of the people; but it was not in fact until Edward III induced Flemish weavers (acknowledged to be the most skilled craftsmen) to settle in England, that a fine weaving industry arose.

The first “factories” began to appear in the woollen industry just before this time, and had their origin largely in the temporary decay of manufacturing towns which resulted from a desire to avoid the Gild restrictions. The Gilds’ day of usefulness was passing; and from 1490 or 1500 onwards, manufacturers sought to transfer their activities to villages where no Gild restrictions existed.

The “factories” of this stage were rather an aggregation of workers’ dwellings, forming a small community or village, than a factory in the modern sense; yet this system resembled the factory system in the aspect of combination and division of labour under the direction of a capitalist owner, *e.g.* the master weaver. This is generally known as the “domestic” system, and is referred to again later.

In addition to agriculture and weaving, the only other industry of note in these times was metal-working. In this trade, as in weaving, foreign influence was felt, and again tended towards better products. The prosperity of metal-working owed its origin and support to the manner of life of the times. The metal-worker was concerned first with war-like weapons, and only secondly with peace implements. Although iron-smelting, with wood as fuel, was practised in England, the bulk of the armourers’ raw material was imported.

As the fifteenth century drew to a close, the Middle Ages and the typical life and customs of that period were gradually replaced by the new spirit of the Elizabethan age. The old manorial and feudal land system was dying out, and commercial competition was arising as the shackles of the decaying Gilds fell away; the middle classes, prosperous merchants and manufacturers, were becoming the mainstay of the realm; foreign trade was developing; and there was a new spirit of adventure and inquiry abroad.

“ We stretch out our hands across the abyss of time and realise our fraternity with the Elizabethans, as we never do with the ages of faith that preceded them or the age of Augustan reason that followed. Queen Anne is dead, but Queen Bess still haunts every old inn in England.

To this frail-looking woman, whose coronal of red hair, pale, pointed face, and piercing, humorous eyes still flame out upon us in portraits from the dead encumbrance of her robes and jewels with the unquenchable vitality of genius, it fell to guide and consummate that great transition from the old world to the new which Froude has described in one of the most magical passages of his ‘ History ’ :

‘ The paths trodden by the footsteps of ages were broken up; old things were passing away, and the faith and the life of ten centuries were dissolving like a dream. Chivalry was dying; the abbey and the castle were soon together to crumble into ruins; and all the forms, desires, beliefs, convictions of the old world were passing away, never to return. . . . And now it is all gone—like an unsubstantial pageant faded; and between us and the old English there lies a gulf of mystery which the prose of the historian will never adequately bridge. They cannot come to us, and our imagination can but feebly penetrate to them. Only among the aisles of the cathedral, only as we gaze upon their silent figures sleeping on their tombs, some faint conceptions float before us of what these men were when they were alive; and perhaps in the sound of church bells, that peculiar creation of the mediæval age, which falls upon the air like the echo of a vanished world.’

The young girl who emerged from virtual captivity at Hatfield to mount her insecure throne in 1558 found an England that was still a subordinate link in the European system, still a province in the spiritual dominions of the Papacy, still, through the Spanish marriage of her sister Mary, a pawn in the dynastic struggles of the Continent, overshadowed by the ghostly sceptre of the Holy Roman Empire. She died leaving a self-contained island ruling an independent empire of the ocean. It has been lamented, but it was a fact the most momentous fact in English history.”

The Times, 7 Sept., 1933.

Industry in England was, however, as yet but little developed; and sheep-farming, cloth-making, and metal-working were still practically the only industrial activities. These were reasonably prosperous at the time when Elizabeth came to the throne; and it was during her reign that England changed from a wool-exporting to a cloth-exporting country.

The enclosure movement, and the debasement of the coinage for which Henry VIII was responsible, had tended to the creation of considerable poverty and hardship among the labourers and lower classes generally. This condition persisted throughout Elizabeth's reign in greater or less degree, despite the introduction of the first Poor Law, and has since never entirely disappeared from our national life.

The sixteenth and seventeenth centuries saw practically no important industrial inventions; but the hosiery trade was established in Derby, Nottingham, and Leicester in the seventeenth century. Development in the iron industry was hindered by the fact that wood-smelting was still employed, and wood was needed to an increasing extent for shipbuilding. In fact, a series of Acts was passed preserving the forests for shipbuilding by limiting the number and position of iron works. In textiles, except for the introduction of the stocking frame for hosiery, there were no mechanical improvements or inventions.

There grew up, however, the domestic * system to replace the Gild system in industry, which broke down principally because, as has been mentioned, the extreme exclusiveness of the Gilds led to spinning and weaving being established in towns where there were no Gild restrictions. Under this system, the workpeople worked at home and men, women and children were paid to spin by "capitalists," who in turn gave out the yarn so produced to weavers for weaving. Though it helped many of the poorer workers by providing work auxiliary to their main occupation on the land, generally speaking it produced very oppressive labour conditions. The domestic system lasted until the Industrial Revolution replaced it by the Factory system.

The policy governing trade in the seventeenth and eighteenth centuries was that of "Mercantilism," † which found

* In a few trades, still, the outworker continues the domestic system.

† In the nineteenth century, this policy was abandoned.

expression in the Navigation Act of 1651 and its subsequent amendments. The four principal aspects of Mercantilism are set out below, and their resemblance to the tenets of modern "economic nationalism" may be noted.

"(a) Goods must be carried in English ships—to encourage the shipbuilding trade.

(b) Agriculture must be fostered—to make the country self-supporting.

(c) Home manufactures must be encouraged and competitive imports discouraged—to provide employment generally.

(d) Gold must be accumulated, and therefore exports must be encouraged and imports discouraged." ¹³

Apart from the important change above-mentioned in production organisation, the other development of lasting effect was the growth of overseas trade, which synchronised with the adoption of Mercantilism. This expansion had its beginning in the Merchant Companies, established for the trade in wool and cloth. The Merchants of the Staple, the earliest organisation of this kind, gave way to the Merchant Adventurers. As voyages of discovery revealed new parts of the world, a new form of trading company began to come into existence—the joint-stock company,* created to exploit trade in specific parts of the world. The Muscovy Company (1555), the Levant Company (1579), and the East India Company (1600) were examples of this form.

It was in the eighteenth century that the most important change affecting industrial history began to take effect, namely, the introduction of machinery to aid and supplement the manual methods of production which had persisted with little alteration for hundreds of years. With it came the new organisation employing large capital, with its corollary of a larger scale of operations. Hitherto, the "capitalist" had employed only a few persons with whom he was in fairly intimate contact, and alongside of whom, indeed, he frequently worked himself. Thus began the process of divorcement of the ownership of business from the workers employed by it.

Meanwhile the land enclosure movement was revived. By 1700 the early movement had slowed down and, in all, hardly more than half the rural areas had been enclosed. In the

* See Vol. I.

first half of the eighteenth century more and more common land was taken in, until between 1770-80, and again between 1800-20, rapid progress in agricultural improvements resulted in the practical completion of the operation. As regards crops, Tull, in the early days of the century, did pioneer work in what may be called tidying up the land and improving methods of sowing. Later, Coke of Holkham caused a great advance by advocating the more efficient rotation of crops, and as a result yields per acre at once rose. Agriculture became profitable; "but, for the most part, the lot of the agricultural labourer was seriously worsened."¹⁴ A simple rotation of crops and pasture called "convertible husbandry" had long been followed without enclosures, but enclosure was essential to the improved methods.

Machines for ploughing, harrowing, sowing, reaping and winnowing, and haymaking, were invented from the first part of the eighteenth century onwards; and agriculture was now on the way to becoming scientific, although science in the sense of the adoption of chemical fertilisers, etc., was not utilised until the second quarter of the nineteenth century. Stock breeding also received attention during the century, Bakewell in particular doing pioneer work with sheep—improvement being achieved from the point of view of both meat and wool.

But perhaps the most important of all developments in this century is to be found in the growth of the cotton industry. In 1700 the industry was of negligible importance, and was discouraged rather than encouraged because of the feared competition with wool and lack of raw material. Before the full mechanisation of the industry, cotton-linen goods only were made, having cotton threads for the weft and the stronger linen threads for the warp. Half-way through the century, however, linen was almost as difficult to obtain as cotton. About 1760, bounties were given to the colonies to encourage production of the raw material, which tended to remedy the position.

The cotton industry was the first to benefit from the new inventions and improvements which were being put into use about this time; but, as these were at first almost entirely confined to the spinning side, a lack of balance arose owing to the inability of the weavers to absorb the increased production

of yarn. This was at first the cause of considerable opposition to the new spinning machine on the part of the spinners.

In the wool industry, machines were not employed until some thirty or forty years later. The reason for this lay undoubtedly in the fact that the cotton industry suddenly became important, and had to win its way by enterprise against the already entrenched woollen industry. There was, in fact, no labour force directly available for cotton; and it was shortage of workmen that led to early mechanisation.

With wool, the position was just the reverse. Here was an old industry with plenty of skilled craftsmen and labour available, and no incentive to adopt machines until the experience of the cotton trade proved their value; also cotton began displacing wool as a material for the clothing of English people.

The most important development in the wool industry in the eighteenth century was the gradual shift of location to Yorkshire from East Anglia, the West of England, Scotland and Wales. This move was stimulated by desire to take advantage of pure water from the Pennine streams, and the convenience of being near the dye works situated in the North. As power-driven machines came into use, the movement to Yorkshire was hastened by the desire to be near the areas where the presence of coal and iron facilitated both the generation of power, and construction and repair of machinery.

The new spirit of invention and improvement extended also to the Coal and Iron Trades. Coal production was facilitated by the use of the first steam engines for pumping at the mines; and at the same time a new and greatly increased demand arose for coal for the new iron-smelting process, in which wood had been replaced by coal.

The use of machinery, in all industries to which it was applied, had opened up new possibilities of production of cheap, uniform goods. It remained only for steam power to be applied to machinery, to set in motion the great revolution in industrial methods which changed England, in the space of comparatively few years, from a predominantly agricultural country to the greatest industrial nation in the world.

To assist the student in correlating the various phases that have been briefly outlined above, a time chart, Fig. 2, is provided.

Century	Agriculture	Industry	Commerce
10th	Manorial System	'Family' System	Rudimentary largely Barter
11th			
12th		Craft Gilds	Gilds Merchant
13th			
14th	Enclosure of Land	Apprenticeship	Merchants of the Staple
15th			
16th	Increase of Enclosure for Sheep-farming	Domestic System	Merchant Adventurers Merchant Companies
17th			
18th	Enclosure of Commonland Improvement of Agriculture	Textile Inventions Factory System	Improvement of Transport Joint Stock Enterprise
19th	INDUSTRIAL REVOLUTION		

FIG. 2.—Time Chart of Agricultural, Industrial and Commercial Development.

CHARACTERISTICS OF THE NINETEENTH CENTURY

At the close of the seventeenth century, England ranked well below France and Holland as an economic power. Despite the expansion of maritime activity under Mercantilism at that time, this country was still inferior in shipping, and indeed in general development, to Holland. As France was then industrially more organised, it is not surprising that England, whose industries were, as has been shown, confined to a domestic manufacture of woollen goods and a rudimentary metallurgic industry, was, in this respect, far behind her near neighbour.

In the eighteenth century, Holland's development was arrested—her Gild organisation was so strong that it shackled her development—and the first two Powers in this century were France and England, in that order. Between them the struggle was joined for overseas possessions—a struggle which terminated in favour of England. Between them also were evolved the social and technical developments which gave to the world the Industrial Revolution.

In *Industrial and Commercial Revolutions in Great Britain during the Nineteenth Century*⁵¹ (a work of much value to the student, and drawn upon here), L. C. A. Knowles claims, firstly, that the nineteenth century effectively began with the French Revolution in 1789, and secondly, that that century was the “product of French ideas of personal freedom combined with English technique.”

The question of personal freedom is of great importance, although as a late eighteenth-century feature it concerned the rest of the world much more than it affected England, for the very good reason that England had been enjoying it to a greater extent for many decades than most foreign countries. The binding of the agricultural worker to the land, and the grip of the Gild on the industrial worker, were conditions which had practically died in England; but they were very much alive on the Continent until the French Revolution, almost in a day, set up a new standard of mobility of labour.

Amongst the circumstances favouring the occurrence of the Industrial Revolution a very high place may be assigned to the mobility of labour, made possible by the new personal

freedom and made practical and effective by the new means of transport.

The nineteenth century may, therefore, be considered to have five major aspects⁵¹ which distinguish it from the preceding centuries, and make it the beginning of the modern industrial age :

Abolition of restrictions on personal freedom and mobility.

Physical effects of machinery driven by steam.

Application of steam to sea and land transport.

Emergence of new national economic policies.

New state activity in the colonial sphere.

On the first, sufficient has been said to emphasise its importance as a condition which had to be satisfied before industry could march forward.

Physical Effects of Machinery Driven by Steam.—For the moment it is only necessary to note that both France and England were definitely committed to the mechanisation of industry by the use of steam power by the end of the eighteenth century, while in Germany, Russia, and the United States the transformation came later. It is far from certain that these latter powers have not, in the long run, benefited by the fact that they did not adopt machines until much of the pioneer work had been done, and many of the initial mistakes had been made, in England and France.

Application of Steam to Sea and Land Transport.—The coming of railways and steamships meant, of course, much more than the increased mobility of labour which it made possible. It affected also the location of industries within a country, in that it meant that the location was no longer conditioned only by proximity to the point of importation of raw materials. An industry could now, and largely did, move to the locality which for other reasons was most suited to it.

It brought iron and coal together, in places where previously the cost of moving iron to the nearest coal, or vice versa, had been prohibitive. It made possible the industrial and commercial development of inland areas. It made accessible new markets, territorially speaking; and thus gave a new meaning and new impetus to colonial expansion. It also expanded markets in terms of commodities dealt in, in that, owing to increased speed of transport, perishable goods could for the first time be handled with a minimum risk of deterior-

ation. Further, owing to increased capacity, bulky goods, such as machinery, mineral ores, and raw materials of all kinds, could be moved on a scale previously undreamed of.

Arising from these changes, a revolution in commercial methods followed. As transportation became more rapid and reliable, the growth of large business concerns with world-wide interests followed; and, at the same time, this growth stimulated the development of associations of the employed—these associations themselves being only possible owing to the advancement of means of communication. All countries came into a closer economic relationship.

The drift of the population to towns, which had been little more than a pronounced tendency in the preceding centuries, now became an avalanche. Emigration, too, began on a huge scale to the New World and opened up new areas both as markets and as sources of raw material. The conception of world economic policy, world commercial enterprise, and world inter-dependency became a reality.

Emergence of New National Economic Policies.—Throughout the nineteenth century the peoples of Europe were forming new political units; which, in effect, brought together under a national label groups of people of common racial, historical or religious affinities. These new nations, United Germany, Italy, Belgium, Greece, Bulgaria, Serbia, etc., naturally brought new view-points to economic policy. It was natural also that these new view-points should have their effects on the older nations. Again, all nations sought to use the new transport facilities to develop the land in the new regions.

To every nation there came the problem of what attitude to adopt towards the new conditions of industry, commerce, finance, transport, colonisation. These things had early assumed an individual importance which demanded greater attention than heretofore.

The State had in effect to decide whether it should intervene in the new activities, or allow private enterprise to conduct them in its own way. If it allowed individuals to operate, were regulations to be imposed on them, or was complete freedom of development to be allowed? In fact, the nations decided on the policy of *laissez faire*, the policy of the most complete freedom to individuals to act without restriction.

It is interesting, however, to see how such a policy came to be adopted after long centuries of active government control. What had happened was that the old landed aristocracy had already begun to fall into decline, and to give place to a new plutocracy, the new industrial and commercial moneyed classes. These classes were of pronounced liberal and *laissez faire* tendencies, and clamoured for the old mercantilist policy to be swept away. Free Trade was adopted as the new policy for an industrialised England.

As, however, nationalist feelings intensified as the new nations gained in solidity, a more intense international competition for markets arose, and in the last quarter of the nineteenth century a reaction from *laissez faire*, which in commerce amounted to cosmopolitanism, followed. Except in this country, protection became the commercial policy, and State regulation on every side increased.

Labour organisations, as their strength grew, demanded legislation to protect their members from abuse. Capital at the same time was increasingly organised on the grand scale; and trusts and combines menaced, or were thought to menace, the community with the threat of "monopoly." Railway combines often became, in fact, complete monopolies; and in Germany and Russia most of them were transferred to national ownership.

Huge agricultural imports from Australia and the Americas brought serious depression in agricultural industry, which the European Governments endeavoured to correct by legislation.

New State Activity in the Colonial Sphere.—The new nations, young and hopeful, were naturally anxious to extend their activity overseas. The new industry needed new sources of raw materials and new markets. The new transport enabled new areas to be opened up, and so the nations competed actively with one another in the pursuit of colonial development.

It is worth while noting here the contradiction that had already grown up, which lay in the antithesis, on the one hand, of an industrial world binding, in its very nature, every nation in the closest economic ties, and, on the other hand, a commercial world, built of separate units (*i.e.* nations) determined to remain separate, and, furthermore, swayed by the urge to establish themselves abroad by colonisation, and extend their "spheres of influence."

The effect was, if the whole economic structure of the world be visualised in three stages, *i.e.* :

- | | |
|-------------------------------|--------------|
| (a) Provision of Raw Material | } Industry ; |
| (b) Manufacture | |
| (c) Distribution | Commerce. |

as though between the last two a great artificial blockade had been instituted. It is understandable that trouble ensued, and has persisted.

THE INDUSTRIAL REVOLUTION

It is fitting to consider now why the Industrial Revolution should have occurred in Great Britain first. France was an industrial nation, and Holland a maritime nation, while England was yet comparatively undeveloped and largely agricultural. Why did neither of those two lead the Industrial Revolution? France, for example, had a population of 26 millions in 1789 when Great Britain had only about 9 millions. France had ample capital also. Her imports and exports were greater than those of Great Britain. Just before the French Revolution, the total of French foreign trade (imports and exports together) was about £40 million* compared with an English total of £32½ million.†

The explanation probably lies in three general reasons. First, the very much larger population of France, which at first sight would seem to provide an ideal labour force for new industry, meant that there was no labour shortage in that country to cause industry to consider organising itself on new lines. In other words, the considerations which made the cotton industry adopt machinery before the woollen industry in England were repeated as between England and France. Secondly, France naturally took some time after 1789 to settle down to normal thought, after the physical and psychological disturbances of the First Revolution. Thirdly, the new personal freedom that was thereby created in France had been established for many years in England; and the workers in this country were not merely comparatively free, but used to the idea of being free, and accustomed to a certain amount of liberty to move from town to town as occasion demanded.

* Levasseur.

† Leon Levi.

Holland, apparently, had every advantage for leadership of the Industrial Revolution. She had capital, maritime organisation and plentiful facilities; and she had a small population, with the consequent natural urge to seek labour-saving devices. Her trouble, however, was that her trade was on the decline; and her archaic Gild organisation in industry handicapped her in the adoption of machines. Again, Holland was not, and has not ever become, an industrial nation, with a strong tendency to develop the conception of large-scale organisation and production.

Four further special considerations contributed to England's taking the lead. One was her geographical position. She was more favourably placed than the important continental European countries, from the standpoint of sea communication with the "new" countries which were assuming such great importance in trade. She could thus more easily than her rivals sell and buy in any market; and, by a long period of maritime adventures, she was well equipped and experienced to do so. The second was England's freedom from internal war and invasion. The third was her freedom from internal tariff barriers. So completely has that feature dropped out from national economies that it is quite difficult and very illuminating to realise that up to 1789 in France, and as late as 1834 in Germany, there existed thousands of internal tariffs and tolls. The fourth and not least was her inventive genius.

Both the Industrial and Commercial revolutions turned on coal and iron, and the power to transport them. When Great Britain, after experimenting with water power in the eighteenth century, began to organise her industry so as to take advantage of steam power in the nineteenth, new possibilities arose.

The development of steam power meant the development of coal. The use of coal as fuel meant the restoration to agriculture of many thousands of acres of land previously devoted to the growth of wood for fuel. The importance of coal in the new industry led to the concentration of population on and around the coal-fields. The use of steam as a driving power created a demand for iron, for engines and machinery, while to make the machines a new industry, engineering, arose.

Further, to bring the iron and coal together to make the machines, new forms of transport were required, and these in turn meant new demands for coal and iron for their construction. After Steam, Iron, Coal, and Machinery, came the Chemical factories, also with a large demand for coal. As a result, coal-mining became so important that the quantity of coal produced or imported became the criterion of a country's degree of development. Because her production of iron and coal was, comparatively speaking, poor, France fell behind England, the United States, and Germany in the nineteenth century.

✓ It is possible to regard the Industrial Revolution as comprising six great developments,⁵¹ each one reasonably distinct, but each one absolutely dependent on the others.

(a) The development of the Engineering Industry, for the manufacture of steam engines, textile machinery, mining machinery, locomotives and steamships.

(b) The development of the iron-founders, whose products helped the engineers in the production of machines. The demand for machines thus created large-scale iron foundries.

(c) The third great change was the application of the machines so manufactured, and of steam power to work them, to the manufacturing processes of the textile industries. The inventions were applied in actual practice first to spinning, and later to weaving when the supply of yarn progressively exceeded the capacity of hand weavers to utilise it. Generally speaking, machinery was adopted in the textile trades in the following order:—Cotton, Wool, Linen, and finally Silk.

(d) The fourth development was the creation of the great chemical industries. This was essential in order that the finishing processes of the textiles—bleaching, dyeing and printing—which are mainly chemical processes, could keep pace with the output of piece goods. The rise of the chemical industries reacted on the other developments by increasing the demand for mechanical equipment and for coal.

(e) The great development of coal-mining was the fifth change. Coal, however, could not have been mined in sufficient quantities, or sufficiently cheaply, had it not been for mechanical power, and indeed the success of all of the foregoing developments was contingent upon steam power.

(f) The final achievement, which in a sense vitalised all these potential developments, was a corresponding improvement in the means of transport by rail and by sea. It would be an almost hopeless task to allot degrees of importance to these various changes; but at least the final change, the development of modern transport, was of such outstanding importance that the Industrial Revolution in England falls chronologically into two stages, corresponding to the means of transport at each period.

The two periods referred to are contrasted in the table⁵¹ given below.

	Trades affected.	Organisation of Capital.	Organisation of Labour.
PERIOD A. Metalled Road and Canal Period (1770-1840).	Textiles — Cotton, Wool. Engineering and Metal Industries. Mining. Chemicals.	One-man business or family firms. Partners.	Local Unions. Friendly Societies.
PERIOD B. Railway and Steamship Period (1840-1914).	Widespread application of machinery to other trades. Rise of new trades: Steamships, Railways, and Acid and Basic Steel, Electrical Appliances, etc.	Joint Stock Companies and Joint Stock Banks. Amalgamations and Combinations:— (a) National in scope. (b) International. Horizontal — i.e. businesses of same type. Vertical—including all or most processes from raw material to finished article. Banking Amalgamation.	National Unions of one Trade. National Federation of various Trades.

The first phase coincides with improvement in roads and inland waterways. Industrially, it was concerned with the early stages of the development of coal and iron mining, engineering works, and the early machines in the textile trades. As to commercial organisation, the feature of the

period was the small firm, often a one-man concern or a family business. The employees were not yet organised. Indeed, associations of organised labour were not permitted in England until 1825, in France until 1884 and in Germany until 1892. The coming of railways and steamships (the second phase) heralded the period of real activity of revolution. Mechanical inventions which, in the first phase, had originated very largely in this country and, to a lesser degree, in France, now spread like wild-fire over a Europe which benefited from the lesson of freedom learnt from the example of France. At last other trades, outside the textiles, began to be mechanised—boots and shoes, building, carpentering, ready-made clothing, milling of flour, food-preserving, printing. New trades grew up, such as the manufacture of Bessemer steel, electrical appliances, production of petroleum, electro-plating, not to mention the great extension of mining and engineering. All these things were done on such a large scale that the old small-firm organisation became inadequate, although it remains to-day to a considerable extent.

An enormous amount of capital was required, and the organisation to provide it had to be created. The rapid growth of banking, and the emergence of the modern joint-stock company, provided the answer to this problem.

The new owner and employer in industry is the shareholder. With commerce carried on by huge impersonal concerns, competition became fiercer and more ruthless until the solution of vertical and horizontal combines was found, and eagerly adopted. The trust, the combine, the shipping ring, or whatever form of combination was adopted, were formed to avoid competition, or crush it where it remained; and these organisations showed a pronounced tendency to acquire international scope.

At the same time, labour was organising itself; and the tendency to monopolistic production called forth the reply of labour combinations on an increased scale. Again, the tendency towards international combination became evident. Thus, in the "railway period," combination, owing to development of means of communication, became physically possible to both masters and men, and to both seemed eminently desirable. The masters wished to avoid the uncontrolled competition of rival businesses; the men, that of underpaid

workers. Organised capital was thus faced for the first time with organised labour.

Economic and Social Changes.—Before studying the development of individual industries in the next chapter, it is necessary to consider briefly the social and economic changes which arose out of the new industrial order. The development of old and the rise of new industries brought about five major alterations in the social and economic structure of Great Britain.

(1) 'There occurred the break-up of the domestic system and its replacement by the factory system. / The old condition of having simple machines installed in the home and worked by the family, aided sometimes by learners or apprentices, could no longer apply when machines became large and expensive, and required to be worked by steam power.

As a result, craftsmanship in the sense of handicraft skill declined. Skill was transferred to machines, which demanded from the operative another, different, type of skill in attending them. These operatives were necessarily compelled to tend the machines all day for a wage in the place where they were installed. The effect of this was to do away with home workers who could divide their time between agriculture and manufacture; consequently, agriculture became short-handed, and mechanical development in this direction was thus hastened. Personal independence as to hours and conditions of labour was lost, and the family became dependent solely on its factory wage-earners.

(2) The growth of towns is notable. The grouping of population in the industrial areas around the coal-fields naturally implied the building of new towns, and the expansion of existing ones, on a large scale. Unfortunately, little thought was given to planning and hygienic considerations. Absence of regulations permitted the most insanitary conditions to obtain; and mortality, especially infant mortality, was excessive among the factory class. The story as set out by various historians makes tragic reading, though home conditions under the domestic system were equally scandalous, by present-day standards.

The following figures,⁵¹ which refer to Preston, typify the heavy child-mortality, and the short lives of the working class.

PERIOD—Mid 1837 to Mid 1843.

Social Class.	Average Age at Death.	% above five years old.	% under five years old.
Gentry . . .	47·39 years	82·43	17·57
Tradesmen . .	31·63 years	61·78	38·22
Operatives . .	18·28 years	44·58	55·42

(Assuming in the working class that the 55·42 per cent. died at 2½, then the remaining 44·58 per cent. died at an average age of 37·89 years.) It took many years to evolve more or less sanitary conditions; and the standard of housing in many areas still falls far short of the requirements of a highly civilised nation.

(3) 'It brought about a Commercial Revolution. Great Britain had to be re-organised for large-scale production and world exchange.' She became dependent to a degree surpassing anything previously experienced, on other lands for raw materials, and for markets for the finished articles. In time, as the population grew enormously, she ceased to be self-supporting for food, and increasing proportions of the total quantity consumed had to be imported. These food imports had to be paid for by correspondingly increasing exports of coal and manufactures, together with the well-known "invisible" items of shipping and financial services which, since they represent earnings coming in, are equivalent in effect to goods going out. ^From these developments grew the joint-stock enterprise, the transport combines,'etc., which have been briefly referred to above.

(4) 'New parts of the country became important. It is interesting to note that in 1750 the wealth of England was concentrated in the South, where, too, the bulk of the population lived. By 1800, Lancashire and Yorkshire had become two of the most populous counties. The area around Glasgow had developed a cotton industry. South Wales, almost uninhabited in 1750, was transformed into a coal and iron centre. Leeds and Huddersfield took over the woollen trade of the West of England, and Bradford the worsted trade of Norwich. Iron and steel raised Staffordshire and Warwickshire to the front rank in population and in wealth. These changes were quite rapid, having been effectively completed in a century.

(5) The fifth alteration was one of the most important—

the embitterment in the relations between Capital and Labour. Its importance lies in the fact that to-day the effects of the earlier clash of interests are still evident, and the development of more harmonious industrial relationships is still faced with many difficulties.

Development of Industrial Relations.*—Under the domestic system, the capitalist had been essentially a small man giving out orders to a not very large group of scattered workers. On the one hand, such workers were scarce, and had, as has been shown, alternative part-time employment in agriculture and thus had at least the sense of independence. On the other hand, they did not meet one another every day in the close conditions of a factory, and certainly had few opportunities to get together to form any group opinion on such subjects as rewards for work and conditions of employment.

Again, the master was not very far removed from the man, who might by skill in his craft and diligence become a master himself, and very often did. He had probably no objection to working for a master. Thus, although the conditions in which he worked were frequently extremely squalid, there was no active class consciousness and little class strife.

When the workers moved into factories, all this was changed. The worker had a whole-time job, and the stand-by of agriculture had to go. Again, on the one hand population was growing, and on the other hand machines required fewer operatives for the same output. For these reasons, the worker became far more dependent on the will of his employer, and therefore more conscious of the existence of that controlling will.

He was thrown constantly into the company of his fellow-workers, whose interests were, with his, directed to questions of pay and working conditions. Thus group consciousness, crystallising into class consciousness, came into being. This consciousness was sharpened by the increased gap between the worker and the master, who was now a bigger man, occupying a station which the worker had less and less chance of reaching. If the workers wished to object effectively to their conditions, they could only hope to be successful by group action. Hence the Trade Unions, which at first were suppressed (but later were permitted in the form of Friendly Societies

* See Ch. VIII.

of limited size and scope), came into being. In 1824-5 the Combination Acts were repealed, and the workers were legally free to combine, although only in a restricted manner. They had no political status, however, and could only express themselves by strike and riot. With a complete *laissez faire* policy in vogue, wages regulations were of course non-existent; and, until appropriate legislation had been put into force, riots were frequent.

Children under home-work conditions had doubtless often been sweated. Under factory organisation their position ultimately improved, though it first worsened tragically for a long time. From quite early in the nineteenth century, attempts were made by the State to remedy the abuses to which they were subjected. It is not necessary here to trace in detail the growth of legal protection for children. However, one major development arising from the Factory Acts should be noticed. Their tendency was, of course, to throw children out of work; for example, the Act of 1833, perhaps the most important, threw 40,000 children out of employment. It at once became obvious that these children, spared the drudgery of factory labour, must be given some sort of general education if they were ever to become useful citizens. Thus the restrictions on children in factories led almost directly to the development of State education for children.

CHAPTER II

MAIN FEATURES OF EARLY TECHNOLOGICAL DEVELOPMENT

Once the Industrial Revolution got under way, technological development grew apace, so that of its earlier stages only can a simple picture be presented. There is, however, merit in this restricted treatment, as it enables the student to see how dependent technological progress has been on the initiative of the individual.

The transition in matters industrial which has taken place between the end of the eighteenth century and to-day—nearly half-way through the twentieth century—makes the story in this Chapter seem a hazy relic of antiquity. A lifetime of observation would not suffice to fathom all the mysteries of industrial production as conducted now, neither is it necessary to attempt the impossible. Intelligent use of the excellent periodical surveys now available will enable the alert executive to keep himself informed of the main developments.

THIS chapter is in the nature of a supplement to the previous one dealing with the growth of industrialisation, and will serve to elaborate somewhat the more notable stages in the earlier progress of invention and science, and to link up with the student's general knowledge of more modern technological developments. As in the previous chapter, L. C. A. Knowles's work ⁵¹ has been frequently drawn upon.

Attention to the pioneer inventions of the eighteenth and nineteenth centuries has, for present purposes, been confined to the three principal groups :

Textiles (Cotton, Wool, Silk and Linen).
Iron, Coal, and Engineering.
Transport.

TEXTILES

Cotton.—Cotton was the first great industry to become mechanised.

The first process in dealing with raw cotton in the mill is known as carding, which consists of opening out the cotton and getting all the knots and lumps out, so that the fibres are made into a fleecy roll. In the early days, carding was done in the home by the women and children, by means of wire brushes. Spinning, the next step, consists in twisting the fibres together and pulling them out into thread. This was done on a hand or treadle spinning-wheel, and this operation was also allotted to the women.

Weaving, the process by which the yarn is turned into cloth, consists essentially of stretching threads on a frame, and passing other threads through them by means of a shuttle, crossing and re-crossing the former. The stretched threads are known as the warp and the shuttle threads as the weft. The weaving processes during the home industry stage were carried out essentially by the men. The final processes were bleaching and dyeing. Bleaching, in the early days, was carried out by steeping in sour milk, and exposing to the air for a period of months. Dyeing was done by hand, with such pigments as were available.

It was natural that improvements in methods should be applied first in the carding and spinning processes. It was of little use to invent weaving machines, to weave more rapidly, until yarn could be produced more rapidly to feed those machines. One of the first machines devised for the cotton industry was a carding machine, invented in 1748. This machine, however, was imperfect, and was little used until the late 'sixties and 'seventies of the eighteenth century. Spinning inventions increased the demand for carded cotton, and in 1775 Arkwright improved the existing machine, and his machine was brought into general use.

The process urgently calling for machines was, however, spinning. With purely hand methods the spinners could be kept supplied by a similar number of carders, but it took six to eight spinners to keep a weaver supplied with thread. The first spinning invention was by Hargreaves in 1767. His machine, which was hand operated, was called the "jenny." Its initial achievement was 8 to 10 threads simultaneously, and later as many as 100 could be spun at once.

Almost immediately, Arkwright invented another multiple spinning machine. This, the Arkwright water frame, invented

in 1768, was, as its name implies, a machine to be driven by water power. The frame began to be used generally in the trade about 1785. It did not immediately oust the jenny, and the two types of machine developed side by side for some time. The technical advantage of the frame over the jenny was that it spun threads strong enough to be used for the warp in weaving. Previously neither hand-spinning nor the jenny could do this, and linen thread had been used for this purpose. It has previously been observed that shortage of linen threads for warps had put a serious brake on the development of the cotton industry in England. The Arkwright frame enabled the first all-cotton goods to be made in this country.

From the social point of view, the importance of the frame was, of course, that it made a factory industry essential. Unwillingness to go into factories, and general lack of training in the use of machines, retarded the adoption of the frames. A further hindrance was that their adoption was dependent on the existence of water power, and that suitable streams were often situated away from sources of labour. For these reasons the jenny continued in quite general use up to about 1790. But during that time it was itself developed and improved, until, on account of the expense, home workers could no longer afford to own the latest types.

Meanwhile in 1775 Crompton's "mule" was invented. This machine was a combination of the jenny and the water frame; hence its name, implying a hybrid. It was at first a hand machine, and could be used in the home. It could spin the very finest counts of threads, and enabled the manufacture of muslins to be developed in England. The mule was adapted to water power by Kelly of Glasgow in 1792, and Crompton himself worked mules by power in 1803. By 1812, the power mule had definitely displaced the frame for all fine yarns.

The next major development in spinning was the invention of the self-acting mule by Richard Roberts in 1825 which made spinning an automatic operation, but could produce only comparatively coarse yarns. By this time, steam power was rapidly replacing the less dependable and less controllable water power. From 1830 onwards, all the inventions were designed to utilise steam or, later, electric power.

In 1856 the Heilmann comber, a device replacing the old carding methods, was introduced. This was used in the

process of combing the raw cotton, in which the shorter fibres are removed, leaving the longer. It is thus of prime importance for the preparation of really fine yarns, for which cotton of the longest possible staple is required.

In spinning proper, the great development after the mule was what was known as the ring-spinning machine, invented in the United States about 1828. This machine is, in principle, really a throw-back to Arkwright's frame; but is, of course, a product of much finer workmanship, and can therefore work at much greater speeds. Actually, the spindles run at 6,000 or 8,000 revolutions a minute, and the thread is twisted and drawn at the same time. It is quite understandable that if it were attempted to make fine yarns on such a machine at such speeds, breakages would be so frequent as to make the operation wasteful. Consequently, although ring-spinners have been in wide use in England since about 1880, the thinnest thread is still spun on mules which, although greatly improved in details and construction, are still, in essence, the mules of 1825. The mule requires male labour, because it demands strength as well as skill, while the ring-frame can be operated by women. The kind of labour available thus largely determined whether a particular town used mules or ring-frames or, in other words, produced fine or coarse yarns.

On the weaving side of the industry, the first real step towards mechanisation was taken in 1784, when Cartwright's power loom was invented, seventeen years after the invention of the jenny and nine years after that of the mule. Prior to this, however, the first weaving machine had come into existence—a loom employing the flying shuttle invented by Kay in 1733. This machine proved extremely unpopular with the skilled hand weavers; and although improved considerably by Kay's son in 1760, did not come into general use until the end of the century.

Cartwright's power loom, referred to above, was not entirely satisfactory; and by 1800 the efficiency of yarn production so far exceeded that of weaving, that yarn was being exported in considerable quantities, as the following table shows.

This was considered a dangerous aid to competitive weaving abroad, and in 1800 British manufacturers held a conference to try to devise a satisfactory power loom. This meeting gave a great stimulus, and in 1813 a practical and successful power

*Value of Yarn Exports from England.*¹³

	£.
1798	30,271
1799	204,602
1800	447,556
1801	444,441
1802	428,605
1803	639,404
1804	902,208
1805	914,475

loom was evolved by Horrocks, and was in quite general use in the cotton trade by 1835. The table given below shows how, when once a satisfactory loom was evolved, its adoption proceeded apace.

*Total Power Looms in Textile Trades in Great Britain.*¹³

1813	2,400
1820	14,150
1829	55,500
1833	100,000
1835	116,801
1870	440,676
1890	615,714
1903	684,000

According to an analysis published in respect of 1835, all but a very small proportion of the power looms in use were employed on cotton weaving.

Wool.—The woollen industry includes two main divisions—wool and worsted. The distinction lies, first, in the length of fibre required. Long fibres, or long staples, are required for worsted manufacture, while woollen cloths require only short fibres. The second distinction, allied to the first, lies in the initial process. For worsteds, the longest staple wools from, for example, the Merino type sheep are used; and the first process is to comb the raw wool to remove the shorter fibres, which are rejected and used for woollen manufacture. For woollens, any wool can be used; and the first mechanical process is as in cotton carding—the fibres, however, being interlaced instead of laid parallel as with cotton.

The fact that mechanisation in wool and worsted came some thirty years later than in cotton, is attributable to the lack of incentive, due to the comparative abundance of skilled craftsmen as compared with the labour shortage existing in the cotton industry. A further technical reason was the comparative softness of the wool fibre, which meant that it broke easily, and made the application of machines, especially in the more primitive forms, more difficult. The longer staple used for worsted presented, however, fewer difficulties than the shorter staple wool, and when machine spinning did come, it came first in worsteds.

The incentive for the change-over to machinery in wool spinning, was the shortage of wool which arose as the industry grew, and before imports developed. The masters found that the supplies were depleted by embezzlements by the home workers, and consequently changed over to workshop spinning; and from that stage it was a comparatively short step to the use of power-driven machines.

The combing process remained a hand process until after 1840, although about 1779 Cartwright, of power-loom fame, had invented a wool-combing machine, which did not, however, succeed in achieving general adoption. The adoption of the jenny for spinning seems to have come about 1785, or about eighteen years after its application to cotton.

The adoption of power spinning came much more slowly. In worsted, it came roughly at the end of the century; and in 1809 increased incentive to power spinning was given by the invention of the "false reed" or "slay," which guided the shuttle in weaving. This device operated more easily with the rougher mill-spun yarn. In the early years of the nineteenth century, power spinning gradually invaded the woollen industry; but it was a fairly slow process, and not until 1830 could both wool and worsted spinning be said to be on a mechanised basis.

As to weaving, the power loom had penetrated the industry very little by 1835. The 5,000 or so looms then recorded were principally in use for worsted. A Commissioner appointed in 1840 to investigate the condition of weavers reported that at that time power weaving in the wool, as distinct from worsted, industry was still in its infancy. It did not become a definite factory industry in Yorkshire until 1850-60.

The finishing processes of wool and worsted cloths are

complicated, and need not here be examined closely. It is enough to say that they were mechanised at a fairly early date. Filling, which is the process of soaking the loosely woven cloth in soap and water so that it shortens and thickens, thereby making the warp and weft indistinguishable, was carried out with mechanical aid early in the nineteenth century ; and the need for pure water for the process, and for power for the machines, was one of the chief reasons why the modern wool industry settled principally in Yorkshire, where the Pennine streams were available. Shearing also was mechanised quite early. In 1806, there were 100 shearing machines in Yorkshire. By 1817 the number was 1,462.

This very brief treatment of a very important industry is due, firstly, to the fact that in its main stages the processes are the same as for cotton and that the inventions of the one, previously mentioned, apply, with modifications, to the other ; and secondly, to the fact that in the manufacture of both wool and worsted there are many extremely complicated processes, description of which is inappropriate here.

Before leaving these industries, however, reference must be made to the manufacture of shoddy, which is almost an industry in itself, subsidiary to the wool as distinct from the worsted manufacture. About 1800, Benjamin Law discovered that old woollen cloths could be disintegrated and re-spun. In order to improve the resultant product, varying proportions of new wool are added ; and the manufacture of shoddy, which is the name given to this material—a cheap cloth with little tenacity or resistance to wear—is of considerable importance to-day. Some of the Yorkshire towns manufacture little else.

Silk.—The silk industry in this country is quite ancient. Spitalfields, for example, was known for silk-weaving in the sixteenth century. As in the wool industry, the silk industry has two divisions, but here the difference is really in method of manufacture of the yarn only, the results being of equal merit.

Silk fibre, unlike cotton and wool fibres, is continuous, and the process of making it into yarn is different. The process is known as throwing. It uses only the long continuous threads, and naturally there is a quantity of waste, where the thread has become broken, etc. This waste is subsequently

spun into yarn, and this is the second method referred to above. In the beginning, the spinning was exactly comparable to cotton spinning, but after about 1830 the methods used for spinning flax were applied, and from 1850 onwards were almost universally adopted. Thrown silk and spun silk are of equal quality; so that the industry is most economical, in that it uses up its waste to produce a material equal in quality to the initial product.

Machinery for silk weaving was first used in England by Lombe of Derby in 1714. The adoption of power in the silk industry followed some time behind its adoption for cotton. The Jacquard loom, invented in 1801, was an aid to the development of weaving of fancy patterns.

The charm and popularity of silken fabrics have had a two-fold effect. Firstly, silk yarns have tended increasingly to be used for interweaving with other materials, to improve the appearance of the resultant cloth. Secondly, the comparative cost of real silk articles has led to the encouragement of imitative products. For example, in 1844 John Mercer discovered that when cotton was dipped in caustic soda considerable shrinkage occurred, and the fibre took on a high lustre resembling silk, and acquired a greater affinity for dyes. A patent for "mercerising" cloth was taken out some years later, and eventually the material was made in large quantities.

Artificial or Rayon silk has also developed greatly within the last half-century, and it has in a comparatively few years become of great importance. There are three main processes at present in use,¹³ all of which represent methods of transforming cellulose, which is the main constituent of real silk, into a soluble form so that a liquid can be turned into a thread by some sort of squirting process.

- (a) By using a solution of nitro-cellulose in a mixture of alcohol and ether, which mixture naturally evaporates very quickly, as the thread is formed by squirting. This was invented in 1884 by Chardonnet.
- (b) By using a jelly formed by dissolving cellulose in a solution of cuprammonic chloride. This was invented a few years later.
- (c) By converting the cellulose into zanthate of cellulose, which can be made into a jelly with water by

the action of caustic soda and carbon disulphide. This method was invented in 1892 by Cross and Bevan, and greatly improved in 1901.

Linen.—The linen industry, although important in Ireland, where it has now become concentrated in North-East Ulster, is not of great importance in England to-day. Marshall invented a spinning machine for flax in 1788, but the sticky nature of the fibres, and the consequent difficulty in separating them, meant that only coarse yarns could be produced. Kay in 1826 invented a preliminary method of preparation which overcame this; and, by 1840, machine spinning was almost universal.

The slow change to machine spinning was due to the use of Arkwright's frame in cotton spinning, which enabled cotton warps to replace linen warps. The removal of this source of demand for linen yarn meant that hand-spun yarns could be had at very cheap prices; and they were finer than the yarns made on Marshall's machine. There was therefore little incentive to mechanisation. Power looms for weaving came in about 1840, but were not widely used until 1850.

IRON, COAL AND ENGINEERING

These three major industries are dealt with together, for the reason that their main lines of development are closely intermingled. Slow though the adoption of the factory system in textiles was—it took about seventy years at least, say 1780 to 1850—the transformation in the iron, coal, and engineering trades was even more long-drawn-out. This slowness was a brake on textile mechanisation, because of the difficulty of getting machines, while deficiencies in transport made it difficult to move coal about, thus again hindering the adoption of steam engines.

Iron.—It has been shown that the shortage of timber in the early eighteenth century had held back the iron industry. In 1740, only 17,300 tons of iron were produced by a total of about sixty forges. Sheffield and Birmingham were, none the less, demanding iron for their specialised products; and pig iron had to be imported from Sweden and Ireland. Charcoal also had to be used for resmelting the pig. In 1730, the discovery of a method to use coal in the form of coke for smelting was made by the Darbys, at a time when the iron industry of England

was in a very depressed condition. It should, perhaps, be explained that coal cannot itself be used for smelting, because the sulphur content of coal makes the iron too brittle for ordinary use. The Darbys' invention was thus a great boon to the industry. As the use of coal in the form of coke gradually came into general use, the iron works left the neighbourhood of woods and grew up on the coal-fields. This change became marked after about 1750. New iron centres developed in the Midlands, S. Wales, and Scotland.

At the time of the Darbys' developments in iron smelting, Huntsman was experimenting with steel. After many years of investigation and trial at Sheffield he succeeded, about 1740, in making a cast steel by melting Swedish iron (purer than British) in a crucible with charcoal, when the iron took up a small percentage of carbon, which is the essential characteristic of steel. The Sheffield cutlers would not use Huntsman's steel; but he found a ready market abroad, and, after 1770, was so successful that his process was found out at home and copied, and Sheffield rapidly rose to eminence in the steel world. The development of hard steel was essential to the development of machine tools, without which the use of machinery could never have gone ahead.

In 1781, Cort developed the invention of puddling and rolling. This meant a revolution in the final processes of iron working. In 1828, almost 100 years after the revolutionary adoption of coke for smelting, Neilson introduced the hot-blast in the production of pig-iron, which reduced the quantity of fuel required for smelting by more than half.

The following figures⁵¹ of pig-iron production are illuminating:

	Tons per year.	
1740 . . .	17,350	} Road and Canal Period.
1788 . . .	68,300 (Cort's Process, 1783)	
1796 . . .	125,079	
1806 . . .	258,206	
1830 . . .	678,417 (Hot Blast, 1828)	
1840 . . .	1,248,781	} Railway and Steamship Period.
1854 . . .	3,100,000	
1900 . . .	9,000,000	

Coal.—The development of coal-mining was also gradual. About 1711 Newcomen invented a steam engine to pump the water out of the pits, and deeper mining as it is now understood became a practical possibility. This engine had a very extravagant fuel consumption. It was not until the end of the

eighteenth century that Watt's double-acting steam engine was used to provide power for raising the coal out of the pits. Moving coal from the pits to the canals for general distribution was also a problem, which was not satisfactorily solved until, about 1750, iron rails were used in replacement of wooden rails for running trolleys to the canals. In 1812, at a colliery near Leeds, a steam engine was successfully used to haul the trolleys by ropes.

The following coal production figures ⁵¹ show the small scale of its eighteenth-century development :

	Tons per year.			
1700	.	.	2,148,000	
1750	.	.	4,773,828	
1770	.	.	6,205,400	} Road and Canal Period.
1790	.	.	7,618,728	
1795	.	.	10,080,300	
1854	.	.	64,700,000	} Railway and Steamship Period.
1913	.	.	287,411,869	

One of the causes of delay in the expansion of coal-mining was shortage of labour. So great was the shortage, that women and children were employed in large numbers. In 1839, Andrew Smith invented an iron wire rope for hauling up the coal. This invention had the interesting effect of removing large numbers of women from the mines. The reason was that women had been carrying the coal upon their backs to save the use of hempen ropes, which wore out very quickly—"women were cheaper." In 1837 Fourness inaugurated the modern system of ventilation—an important step forward, again with an interesting reaction. Very young children had been largely employed to open and shut doors, specially put in for ventilation purposes. The new ventilation system thus released large numbers of children from underground employment.

A Royal Commission reported in 1905 that in their opinion the quantity of coal still in the ground in this country was then 140,000 million tons, which at the 1903 rate of annual production (203 million tons) would last over 600 years.

ENGINEERING

The use of steam engines grew very slowly. In the first place, a period of sixty years elapsed before Watt's steam engine superseded Newcomen's, the former using only a quarter of the fuel consumed by the latter. Watt's engine was used

in the Cornish tin mines in 1776. In 1782, Watt adapted his engine to provide a turning or a rotative motion, and this extended the use of steam to driving machinery of all kinds, whereas previously it had been limited to pumping. There were tremendous difficulties in the way of development of the use of the steam engine. Manufacture was largely conducted by one firm only, Boulton and Watt, on account of their holding all the patents.

It needs little imagination to realise that the extended use of machinery was only possible as there were means to manufacture the machinery. To the development of metallurgy referred to later,* had to be added that of tools. The following quotation from an American source⁶¹ presents an interesting story of the influence of the early tool builders.

Influence of the Early Tool Builders.—Well-informed persons are aware of the part which machinery in general has had in modern industrial life. But the profound influence which machine tools have had in that development is scarcely realised, even by tool builders themselves.

Three elements came into industrial life during the latter part of the eighteenth century. First, the development of modern banking and the stock company brought out the small private hoards from their hiding-places, united them, and made them available for industrial undertakings operating on the scale called for by modern requirements. Second, Watt's development of the steam engine and its application to the production of continuous rotative motion gave the requisite source of power. But neither the steam engine itself nor the machinery of production was possible until the third element, modern machine tools, supplied the means of working metals accurately and economically.

It is well to glance for a moment at the problems which were involved in building the first steam engine. Watt had been working for several years on the steam engine when the idea of the separate condenser came to him on that famous Sunday afternoon walk on the Glasgow Green, in the spring of 1765, and, to use his own words, "in the course of one or two days the invention was thus far (that is, as a pumping engine) complete in my mind." He was a skilled instrument

* See p. 48.

maker, and his first small model was fairly 'successful, but when he undertook "the practice of mechanics *in great*," his skill and all the skill of those about him was incapable of boring satisfactorily a cylinder 6 inches in diameter and 2 feet long; and he had finally to resort to one which was hammered. For ten weary years he struggled to realise his plans in a full-sized engine, unable to find either the workmen or the tools which could make it a commercial success. His chief difficulty lay in keeping the piston tight. He "wrapped it around with cork, oiled rags, tow, old hats, paper, and other things, but still there were open spaces left, sufficient to let the air in and the steam out." Small wonder! for we find him complaining that in an 18-inch diameter cylinder, "at the worst place the long diameter exceeded the short by three-eighths of an inch." When Smeaton first saw the engine he reported to the Society of Engineers that "neither the tools nor the workmen existed that could manufacture so complex a machine with sufficient precision."

Smeaton himself had designed a boring machine in 1769 for the Carron Iron Works for machining cannon . . . the work resulting was inaccurate.

Fortunately, in 1774, John Wilkinson, of Bersham, hit upon the idea, which had escaped both Smeaton and Watt, of making the boring bar heavier, running it clear through the cylinder and giving it a fixed support at the outboard end. The superiority of this arrangement was at once manifest, and in 1776 Boulton wrote that "Mr. Wilkinson has bored us several cylinders almost without error; that of 50 inches diameter, which we have put up at Tipton, does not err the thickness of an old shilling in any part." For a number of years, Wilkinson cast and bored all the cylinders for Boulton and Watt.

The importance to Boulton and Watt of the timely aid of Wilkinson's boring machine can hardly be over-estimated. It made the steam engine a commercial success, and was probably the first metal-working tool capable of doing large, heavy work with anything like present-day accuracy.

We hardly realise the crudity of the tools available in the eighteenth century. In all machinery the principal members were of wood, as that could be worked by the hand tools then in use. The fastenings and smaller parts only were of metal,

and consisted of castings and forgings fitted by hand. There were some lathes of the very simplest type. . . . Such lathes were almost useless for metal cutting. There were a few rude drilling and boring machines, but no planing machines, either for metal or wood. The tool equipment of the machinist, or "millwright," as he was called, consisted chiefly of a hammer, chisel and file. The only measuring devices were calipers and a wooden rule, with occasional reference perhaps to "the thickness of an old shilling," as above. Hand forging was probably as good as or better than that of to-day. Foundry work had come up to at least the needs of the time. But the appliances for cutting metal were little better than those of the Middle Ages.

Such was the mechanical equipment in 1775; practically what it had been for generations. By 1850 it was substantially that of to-day. In fact, most of this change came in one generation, from about 1800 to 1840. Since that time there have been many improvements and refinements, but the general principles remain little changed. With so wonderful a transformation in so short a time, several questions arise almost inevitably: Where did this development take place, who brought it about, and why was it so rapid?

The first question is fairly simple. England and America produced the modern machine tool. In the period mentioned, England developed most of the general machine tools of the present day: the boring machine, engine lathe, planer, shaper, the steam hammer and standard taps and dies. Somewhat later, but partially coincident with this, America developed the special machine tool, the drop hammer, automatic lathes, the widespread commercial use of limit gauges, and the interchangeable system of manufacture.

Some of the most valuable general tools . . . are of American origin. But, with all allowances, most of the general machine tools were developed in England and spread from there throughout the world either by utilisation of their design or by actual sale. On the other hand, the interchangeable system of manufacture, in a well-developed form, was in operation in England in the manufacture of ships' blocks at Portsmouth shortly after 1800; and yet this block-making machinery had been running for two generations with little or no influence on the general manufacturing of the

country, when England, in 1855, imported from America the Enfield gun machinery and adopted what they themselves styled the "American" interchangeable system of gun-making.

Bramah had a shop in London where, for many years, he manufactured locks and built hydraulic machinery and wood-working tools. Maudslay, probably the finest mechanician of his day, went to work for Bramah when only eighteen years old and became his foreman in less than a year. He left after a few years and started in for himself, later taking Field into partnership, and Maudslay & Field's became one of the most famous shops in the world.

Sir Samuel Bentham, who was inspector-general of the British navy, began the design of a set of machines for manufacturing pulley blocks at the Portsmouth navy yard. He soon met Marc Isambard Brunel, a brilliant young Royalist officer (exiled from France), who had started working on block machinery through a conversation held at Alexander Hamilton's dinner-table while in America a few years before. Bentham saw the superiority of Brunel's plans, substituted them for his own, and commissioned him to go ahead.

In his search for someone to build the machinery, Brunel was referred to Maudslay, then just starting in for himself. Maudslay built the machines, forty-four in all, and they were a brilliant success. There has been considerable controversy as to whether Bentham or Brunel designed them. While Maudslay's skill appears in the practical details, the general scheme was undoubtedly Brunel's. In a few of the machines Bentham's designs seem to have been used, but he was able enough and generous enough to set aside most of his own designs for the better ones of Brunel.

Of the earlier tool builders, Maudslay was the greatest. He, more than any other, developed the slide-rest and he laid the basis for the lathe, planer and slotter. His powerful personality is brought out in Nasmyth's autobiography written many years later. Nasmyth was a young boy, eager, with rare mechanical skill and one ambition, to go to London and work for the great Mr. Maudslay. He tells of their meeting, of the interest aroused in the older man, and of his being taken into Maudslay's personal office to work beside

him. It is a pleasing picture, the young man and the older one, two of the best mechanics in all England, working side by side, equally proud of each other.

Joseph Clement came to London and worked for Bramah as chief draftsman and as superintendent of his works. After Bramah's death he went to Maudslay's and later went into business for himself. He was an exquisite draftsman, a fertile inventor, and had a very important part in the development of the screw-cutting lathe and planer. Joseph Whitworth, the most influential tool builder of the nineteenth century, worked for Maudslay and for Clement and took up their work at the point where they left off. Under his influence machine tools were given a strength and precision which they had never had before. Richard Roberts was another pupil of Maudslay's whose influence, though important, was not so great as that of the others.

We have an excellent example of what this succession meant. Nasmyth tells of the beautiful set of taps and dies which Maudslay made for his own use, and that he standardised the screw-thread practice of his own shop. Clement carried this further. He established a definite number of threads per inch for each size, extended the standardisation of threads, and began the regular manufacture of dies and taps. He fluted the taps by means of milling cutters and made them with small shanks, so that they might drop through the tapped hole. Whitworth, taking up Clement's work, standardised the screw threads * for all England and brought order out of chaos.

*English and American Tool Builders.*⁶¹

Up to 1825, the export of many kinds of machinery was prohibited by law; and, although a great deal of machinery was smuggled out, the repealing of the prohibition in 1825 undoubtedly encouraged engineering, by increasing the foreign demand for tools. Skilled British workmen were also in great demand abroad, until the tool inventions of 1820-50 produced machines so reliable that many needed only tending, and the unskilled native workers could do this.

Steel.—Perhaps the most far-reaching invention of the second half of the nineteenth century was that of Sir Henry

* Whitworth outlined his proposals before the Institution of Civil Engineers in 1841.

Bessemer in 1855. The problem of making steel for various purposes was the problem of getting rid of certain constituents, such as silicon, and modifying the proportions of others, such as carbon. This had been done by resmelting pig iron, and using additional fuel. Bessemer devised the method of removing the undesired constituents by blowing air through the molten iron, contained in what has become known as a "Bessemer converter." It was soon discovered that the process would not eliminate phosphorus; and, after 1860, only non-phosphoric ores were used. All sorts of steel could be produced, because all carbon was burnt out and the desired proportion could be added back in the form of ferro-manganese with high carbon percentages. Manganese had already been used as a hardener for steel, and it further enabled British ores to be used for steel-making.

The first steel locomotive was built by Ramsbottom in 1863, and by 1880 two-thirds of the railway track mileage was steel, which had taken the place of wrought iron, which had previously been used. The first steel ship was launched in 1863. Not until 1878, however, was it possible to use phosphoric ores for making steel. Thomas and Gilchrist discovered that if the converter was lined with a substance called dolomite, this combined with the phosphorus in the iron to form a slag known as basic slag, leaving the steel free of phosphorus. This process made available for steel great deposits of phosphoric iron ore. Germany, especially, benefited by this; so that by 1906 the output of her iron and steel industry exceeded that of this country. Basic slag itself forms a useful fertiliser on certain soils.

About 1859, the open-hearth system of making steel was invented by the Siemens brothers. This system consisted, in essence, of melting iron in an open hearth by burning coal gas over it. According to the material used for lining the hearth the product is known as either basic or acid open-hearth steel. The advantage of the method lies in the accuracy of composition that can be achieved; because the process is slow (taking fourteen hours compared with twenty minutes under the Bessemer process), and the product can thus be tested periodically, so that the metal can be run out immediately the desired composition is reached. For all work where the exact constituency of the steel is of real importance open-hearth steel is always specified, although it costs more.

The technical developments in steel production of recent years are too many and too complicated for discussion here. Two major developments are interesting, however. First, it was discovered by metallurgists that the properties of the metal are determined by what may be called its thermal history—the exact changes of temperatures to which it has been submitted, and the order of such changes. Consequently, the exact recording of temperatures became part of scientific steel production : for this purpose electrical pyrometers have been devised.

The other development was concerned with the introduction of other metals into steel. In 1868 Mushet patented a steel containing tungsten, which rendered the steel self-hardening. This was the first of a series of high-speed cutting steels, which have enabled machines, and therefore production, to be speeded up tremendously. In 1900 Taylor and White discovered that tungsten steel, if heated between 1100° C. and 1300° C. and then allowed to cool in an air blast or in oil, becomes steadily harder and will cut at high speeds, and will even continue to cut when the cutting edge is red-hot.

TRANSPORT AND COMMUNICATIONS

The growth of transport lends itself to consideration under four headings :

- Roads ;
- Canals ;
- Railways ;
- Sea transport.

Roads.—Until the eighteenth century, the roads very largely consisted of earthen tracks, in which wheeled traffic cut great ruts. The whole industrial development of the eighteenth century was conditioned by progress in improving the roads. The *laissez faire* policy left this improvement to private individuals, who would obtain private Acts of Parliament to improve certain stretches of road. These people formed Turnpike* Trusts and Highway Boards, and exacted tolls for the use of their particular stretches of road. Although these trusts did greatly improve the main roads, there was still a great network of sub-roads which were untreated, and were supposed to be

* Turnpike, ^{so} called from the style of toll-gate used.

maintained by the various parishes using compulsory and/or pauper labour. Moreover, the work of the many trusts was of varied quality. As late as 1808, the trusts were still unable to find a satisfactory surface material for the roads, which needed, therefore, frequent repairs.

At the beginning of the nineteenth century, McAdam invented a durable road surface composed of small stones, and realised that thorough drainage was essential. At the same time, Telford was setting an example of road engineering, and the trusts were combining into groups controlling the roads of quite large areas, and thus securing greater uniformity of practice.

Just as the roads were getting into a comparatively good condition, the railways came; and the coaches that had paid such a high proportion of the tolls were taken off, the turnpikes became bankrupt, and the Government was forced to do something for road maintenance. Tolls were abolished in Ireland in 1857, and in Scotland in 1878 (the last Scottish toll disappearing in 1883), but in England they persisted in some places as late as 1889.* The Highways Act of 1835 abolished the compulsory labour on the roads, and empowered each parish to levy a rate and appoint a salaried official for road maintenance. In 1888, the care of main roads was handed over to County Councils, the others being made the responsibility of Rural or Urban District Councils.

Canals.—As industry developed in the eighteenth century, the demand for coal necessitated some better method of transport than by carts and mules on the road. Raw cotton, too, had to be distributed in bulk through Lancashire, and the piece goods (rolls of finished cloth) returned to Manchester and Liverpool. So the canals were developed to meet the need.

English canal history falls into two periods : ⁵¹

- (a) 1760–1830—period of increasing development and importance.
- (b) 1830–present day—period of decreasing importance and neglect (with the exception of the Manchester Ship Canal) with, lately, signs of reawakened interest in this method of transport.

* Tolls are still levied on certain bridges.

The first great canal was opened in 1761 by the Duke of Bridgewater, to connect his colliery with Manchester. He built a second one, connecting Manchester with Runcorn, and so with Liverpool. The name of Brindley, engineer to the Duke of Bridgewater, is always honourably associated with the development of canals and the science of canal engineering. There next followed several canals in the Midlands—the “Trent and Mersey” (Grand Trunk), Stafford and Worcester, Birmingham and Coventry. The Grand Junction, connecting London with the Midlands, was authorised in 1798. 1793–97 saw a great burst of canal development and river improvements consequent on the high dividends that existing canals were earning. By 1830 there were in England and Wales 1,927 miles of canals and 1,312 miles of inland navigation (as the deepened and widened rivers were called) together with 812 miles of open rivers.

The canals were designed with horse-haulage of barges in view, and therefore would only take small barges at slow speeds. Owing to the fact that they were built by private enterprise, there were all sorts of variations in width, depth, tolls and grade of upkeep. This greatly limited their value, and made them weak competitors of the railways when the latter came; but they were an infinite improvement on road transport in the condition in which it was, when canals were inaugurated. For a time, the canals took much of the traffic previously done by coastal sailing vessels, but the coming of steamships restored the bulk of this to the coasting trade.

Although the railways quickly outdid the canals in popularity, it is interesting to note that the railway companies were often forced to buy up canals to get rid of opposition offered by the canal owners to the projected railway Bills in Parliament. The competition the canals offered the railways was seriously weakened by their retention of exorbitant rates for an inferior service.

Railways.—As with roads and canals, so with railways, enterprise was left to private persons. They were built in various places, to accommodate existing traffic which had outgrown the canals, and, therefore, on no predetermined national plan. The first Act of Parliament for the construction of a railway was passed in 1801, but by 1835 there was but one passenger line in England, and one, seven miles long,

in Scotland. They met with fierce opposition from the canal companies when trying to get Bills through Parliament; and this opposition was reinforced by the public distrust of what was regarded as a fearsome and impractical innovation. All sorts of grim forebodings were circulated as to the disastrous effect of the smoke on agriculture, and even as to the utter improbability of the trains ever being got to move. Thus, even to get a Bill through Parliament cost a great deal in time and money. Extremely high prices had to be paid for land; and, as a result of these two causes, the English railways have the heaviest capital burden per mile of permanent way in the world. Francis, writing in 1851, estimated that preliminary expenses, including legal and surveying costs, averaged £4,000 per mile, while the following figures illustrate the prices paid for narrow strips of land.

London and South-Western Railway .	£4,000 per mile.
London and North-Western Railway (London to Birmingham)	£6,300 „
Great Western	£6,696 „
London and Brighton	£8,000 „

Added to this heavy capital load is the circumstance of short hauls, with its consequence of relatively heavy expenses. English rail charges, calculated on a basis of short hauls, high speed, and small consignments, are, therefore, very high. The common tendency to regard the railways as an extension of the idea of roads and canals, led to the practice of allowing privately owned trucks to use the companies' tracks.

. Railway history may be divided into five stages :⁵¹

(a) 1821-44—period of experiment and early construction.

(b) 1845-72—period of consolidation of the railway system—formation of the great trunk lines and elimination of canal competition. During this period occurred the great railway speculation mania, lasting from 1843-47, when a financial crisis occurred. £700 million was subscribed in 1845 alone, for railway construction. Despite the crisis the lines were built, and the foundations of the present system were laid.

(c) 1873-93—period of Parliamentary control arising out of the fear of a railway monopoly. The Railway and Canal Commission was instituted.

(d) 1894–1914—period of competition in facilities. Dividends fell, and railway amalgamations were brought about. Development of closer State control on rates. High degree of labour organisation.

(e) 1915 onwards—period of the great combines, and of competition from road motor transport.

Sea Transport.—The first steamship appeared in Great Britain in 1802, although steam navigation had been proposed in the middle of the eighteenth century, and had, in fact, been tried in France, America, and on the Forth and Clyde between 1781 and 1790; but not until long after that was it commonly employed for long voyages. Fulton, in the U.S.A., built in 1806 or 1807 the first really successful steamboat, which plied on the Hudson River, between New York and Albany (110 miles). The first successful British steamboat was the *Comet*, which ran on the Clyde in 1811. The first ship to cross the Atlantic wholly under steam power was the *Royal William*, built at Quebec. This was in 1833. The use of iron, and later steel (the first steel ship was built in 1863), in the construction of steamships led to rapid progress in size, so that their use was gradually extended from the coasting trade to the longer voyages, notably to the American trade. On many routes, however, the sailing ship (which had reached its heyday in the 'fifties and 'sixties in the famous China and Colonial clippers) persisted in large numbers until the beginning of the present century, in trades such as the Australian grain trade, the Chilean nitrate trade, etc., where bulk cargoes were the rule and speed was not essential. The opening of the Suez Canal in 1869, providing a direct route to the East for steamships, gave them a further advantage over sail; and greatly shortened the length of voyages, and correspondingly reduced costs. The earlier objections to steamships—unreliability of machinery and excessive fuel consumption limiting the length of voyages—were gradually overcome by the adoption of screw propellers in place of paddle-wheels, and the use of compound engines and more efficient boilers.

The increase in size of steamships was accompanied by a corresponding increase in speed. This led not only to a vast extension of facilities for overseas trade, but, by inducing a new habit of travel, brought every nation of the world into intimate contact. The necessity of establishing bunkering

stations on the main trade-routes of the world was of great assistance to British overseas trade in providing outward cargoes of coal for British ships engaged in bringing to this country its essential food and raw material supplies, which were obtained more cheaply by the reduction in costs on the round voyage thus made possible.

Air Transport has developed apace in the present century. Many railway and steamer services have already felt its competition so keenly that they themselves directly or indirectly provide air transport. It is increasingly valuable for swift, long-distance conveyance of diplomatic and business personnel, and of commodities of small bulk and high value. Notwithstanding these developments, and the remarkable achievements attending its forced growth and prodigal use during the war, air transport—the modern realisation of the dream of the magic carpet of the *Arabian Nights* tales—is still in its infancy.

Communications.*—While transport of goods and passengers on land and sea was rapidly developing and assisting the great inventions of the eighteenth century to revolutionise the industry and the social life of the country—of the whole world, even—the same end was being served in another way by the invention of new means of conveying messages swiftly over long distances. The original telegraph, which had served to transmit urgent messages between certain places, consisted of a string of semaphores on hill tops, which were able to pass a message through quite swiftly under favourable weather conditions. In 1837, Cooke and Wheatstone invented an electrical instrument known as the needle telegraph, which was commercially exploited in 1846, and by 1868 all the principal towns were connected by telegraph lines.

The “penny post” was introduced in 1840 as the result of the strenuous efforts of Sir Rowland Hill, so that for the first time it became possible to send letters to any part of the country for the same fee, and on the basis of weight. In the same year, the use of postage stamps was begun. Previously the postman collected the postage (on the basis of the number of sheets enclosed) as he delivered each letter. Between the years 1839 and 1843, the number of letters delivered in the United Kingdom rose from 99 million to 265 million. The

* Comparatively recent developments in *e.g.* wireless, television and radar, are beyond the scope of this chapter.

replacement of the mail coach by the mail train hastened delivery. From 1866 onwards, telegraphic communication between all parts of the world was being established by the cables laid on the floor of the sea. An American invention, the telephone, was put to general use in England in 1878. The three principal companies which had been established for the provision of a telephone service were in 1889 amalgamated into the National Telephone Company, which continued until 1911, when the whole service * was taken over by the Post Office.

GROWTH AND SIGNIFICANCE OF METALLURGY

To broaden the foregoing brief survey of the earlier inventions, which directly controlled industrial development, it is appropriate to conclude with a passing reference to the general importance of metals in the scheme of things. Sir Harold Carpenter,⁶ in the course of a lecture before the British Science Guild, provided a résumé which is quoted below.

If the question were asked, what product of the physical universe has contributed most to the material comfort of the human race and the industrial progress of the world, it could be answered with confidence that metals are entitled to the first place. So dominating indeed has their influence been that it is customary to measure mankind's advance in civilisation in terms of the metals with which he very gradually became acquainted and which enabled him to emerge from a state of savagery and pass through barbarism to the present civilisations of the world. His most striking achievements depend either wholly or to a large extent and either directly or indirectly on the use of metals.

Many of the essential activities of daily life appear to be carried on without the aid of metals. Most of us know that steel ships bring us food and luxuries from the farthest parts of the earth, and that food can be preserved in metal containers. But fewer of us think of the steel plough and the tractor which draws it, the reapers, threshers and mills for the handling of crops, and the refrigerating plants and machines designed for treating, handling and packing food. Further-

* Except for the City of Hull, which maintains a municipally owned service.

more, unless we have some connection with productive industry we do not realise the number and variety of metals used in the machinery of the textile, electrical and chemical industries and in the construction of machines that make other machines.

In a country where industrial methods have been developing for at least 150 years it is almost impossible to trace all the ramifications where metals are involved. A multitude of articles is available for the ultimate consumer, and nearly all of them are industrial products. Each of the industries which make the final product depends on a range of other industries for the supply of appliances and machines which in turn depend on others for the supply of raw materials. The modern motor-car is a good example of the focussing of numerous industries on one product. It contains nearly every kind of metal in common use, including different varieties of steel and of cast iron, brass, bronze, bearing metals, aluminium, nickel, chromium, tungsten, copper and a number of others. The ores from which these metals are obtained are scattered all over the world. Elaborate processes are used to extract and refine the metals, alloys are made from them and suitably treated, and finally the product is made to the shape in which it will be required in the car. To produce any one article a whole range of industries is required, and it takes a special effort on our part even to visualise a small portion of the technological processes involved. In its widest sense the term "industry" means all the purposeful productive activities of mankind, and these include agriculture and fishing, which together with mining and metallurgy constitute the primary industries. Usually, however, this term is employed in a more restricted sense to denote industries other than agriculture and fishing. We speak of one country as agricultural and another as industrial. In this sense the beginning of metallurgy was the beginning of industry, and also the beginning of civilisation, for, although in different parts of the world different levels of culture were reached before metals were used, these were all very primitive.

The material achievements of metallurgy constitute, however, only a part of its service to human life and industry. It was in the practice of this art, more than any other, that

man developed those mental attributes which are the foundation of science and modern thought. Whereas in most of the early arts such as crop-raising, stock-breeding and fishing, the human contribution to the process seemed almost incidental, in metallurgy it was the essential feature. From the practice of this art men acquired the mental habit of inquiring into the phenomena that occurred so that they might attain greater control over them, and with this over Nature also. Chemistry developed from the old art of metallurgy, for the first chemists—the alchemists—were men who pursued investigations designed to affect the metallurgical arts in an economically beneficial manner. Their aims were too ambitious and their efforts to convert base metals into gold met with no success and had little effect on metallurgy, but they initiated the studies which have led to the science of modern chemistry. Engineering, though closely related to it and impossible without it, cannot be said to have developed from metallurgy. The metals used by engineers at the beginning of what may be called the modern period had been available for centuries before the work of Newcomen, Cartwright, Watt and Stephenson * showed the wonderful ways in which they could be applied. As a result, the demand for them increased so rapidly that the supply of materials and the technique of their application were quite inadequate, and hard wood reinforced with iron was used for purposes where iron or steel alone were subsequently employed. Since then the engineering, chemical and metallurgical industries have reacted on each other in innumerable ways, to their mutual benefit. Discoveries of new alloys, the extension of the supply of certain metals, and improvements both in their quality and reliability, have opened the way to fresh achievements by engineers, while each advance in engineering or industrial chemistry has made new demands on metallurgy.

*Metals in the Service of Human Life and Industry.**

Technological development to-day is so diversified, and advances at such an ever-accelerating pace, that it would be a hopeless task to try to summarise it in another short Chapter.

* Without belittling George Stephenson's contribution to railway progress, credit should be given to Trevithick as the inventor of the first steam locomotive in 1803.

The student, however, who wishes to keep abreast of events in this field may with advantage read in particular *Industrial Research and Development*, by Sir Frank Heath, G.B.E., K.C.B., and A. L. Hetherington, C.B.E. “. . . a survey of the position of industrial research and development in the United Kingdom up to the end of 1944, and gives an account of the various factors which affect the country's export trade and industrial well-being.”³⁴ Of the five sections of the book, Part I deals briefly with the nature and history of the leading industries of this country; Part II with Research for the Community; Part III with Government Action; Part IV with Independent Institutions affecting Industrial Progress; and Part V with general factors affecting it.

Another valuable work, not so suitable in its entirety to the general reader, but to which a student already acquainted to a fair extent with the processes of some particular industry may refer for an up-to-date and authoritative statement of current developments in its technology is *Industrial Research*,³⁷ Advisory Editor, Professor E. N. da C. Andrade, F.R.S., D.SC., PH.D. This is an annual reference book, published “with the object of assisting all the industries who are contemplating the use of new materials, new processes, new equipment and new types of plant in their factories to obtain better production results, necessary to compete in the world's markets.”

CHAPTER III

RESEARCH, DESIGN, DEVELOPMENT

Said Koheleth the Preacher in the grave, poetic, noble Book of Ecclesiastes : " The thing that hath been, it is that which shall be ; and that which is done is that which shall be done—and there is no new thing under the sun."

Said the great Newton : " . . . to myself I seem to have been only like a boy playing on the seashore and diverting himself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me."

To-day the field of research seems limitless. Its apparent boundaries, when reached, are but vantage points whence wider horizons are seen. Great discoveries will yet be made.

*" Something hidden. Go and find it. Go and look behind the Ranges—
Something lost behind the Ranges. Lost and waiting for you. Go ! "*
Kipling, *The Explorer*.

ONE THOUSAND MILLION POUNDS was an unofficial estimate of the cost of research on, and development of, the first atomic bomb : *sic itur ad astra*—one way or another.

Much has been said and written, over very many years, as to the disproportion between the vast amounts of energy and money willingly—even enthusiastically—poured out in research for war purposes, and the pitifully inadequate support given to research having any other objective.

In the course of a discussion on the wider aspect of research, H. G. Wells in his *Outline of History* expressed the opinion that " we live to-day largely in the age of the alchemists, for all our sneers at their memory. The ' business man ' of to-day still thinks of research as a sort of alchemy." That is perhaps a characteristically brilliant overstatement ; but there is still a tendency to designate and accept as research, particularly in the non-technical field, efforts that go little further than elementary (and sometimes, it is to be feared, superficial)

collection of data. To say that, at the best, this is but information with which research may be commended is not intended to convey a reflection on the value of "raw" information, provided that it is sound; but it may serve as a reminder that research, in whatever direction undertaken, calls always for the use of scientific method in enquiry and analysis, for careful and persistent search for knowledge for its own sake, and for employment of the best and most effective aids to its discovery.

For present purposes, research may be considered briefly, under the following heads :

Market Research.

Business Forecasting.

Management Research.

Social and Economic Research.

Industrial Health Research.

Industrial Research.

Scientific Research is excluded as being outside the sphere of the great majority of industrial undertakings, and on the assumption that scientific research is comparable in scope with "pure" science, and industrial research with "applied" science. This distinction is perhaps difficult fully to substantiate, bearing in mind how highly scientific in the truest sense so-called industrial research can be; but it may help the student to keep his conception of the function within practical limits. It would be lunatic to suggest that each individual business should attempt to explore the whole realm of physical and human phenomena in the hope of deriving some advantage for itself.

MARKET RESEARCH

Market research is concerned with discovery and expansion of new markets for commodities, full utilisation of existing ones, and evaluation of the probable effects of the trends suggested by business forecasting (see below) on both old and new markets.)

In its larger aspect, market research hinges so much on economic measurement that is both difficult to obtain and still more difficult to interpret, that the tendency has been to ignore the basic factors and to consider as market research the collection and interpretation of data relative to consumers' preferences.

Subject, therefore, to the suitability of products for the markets in which they are offered, the more common objective is efficiency of distribution. To effect this, due attention must be paid to :

- Measurement of market potentials or buying power ;
- Consumers' preferences ;
- Dealers' views ;
- Channels of distribution ;
- Methods of publicity.

There is as yet no Government Department dealing with market research comparable, for instance, with the Department of Scientific and Industrial Research.

The very valuable work which the Empire Marketing Board has done for a number of years has been in regard to the special problems of marketing natural produce rather than manufactured goods. The periodical Reports ²³ on economic conditions in overseas countries by the Department of Overseas Trade constitute guidance of incalculable value for the activities of exporting trades.

A great improvement in our Export Trade may be expected to follow a remarkable advance in the organisation of overseas market research arising out of discussions between the Board of Trade and the British Export Trade Research Organisation (BETRO). These discussions resulted in a working arrangement between the Department of Overseas Trade and BETRO, particulars of which were given in *The Times* of 26th March, 1946. A joint committee of that Department (the Export Promotion Department of the Board of Trade) and BETRO was to be set up to review the position from time to time, to plan ahead in the light of current information, and to provide for smooth co-operation between the parties—all to the end that exporters might have every reasonable facility for finding, serving, satisfying and keeping their customers.

Some industries, through their respective trade associations, survey economic and trade conditions in the Home Market—of these may be mentioned the Electrical, Motor and Leather industries. The Federation of British Industries reports regularly also on conditions generally. There is a great deal of assistance offered to manufacturers to encourage them to pursue market research in a comprehensive way.

When the student comes to seek closer acquaintance with market research, particularly in regard to the question of consumers' preferences, he will find the subject extensively treated in *Market Research*, by Redmayne and Weeks,⁶⁰ but the following points may be noted here :

- (1) The main types of market research are consumer research and trade (or dealer) research ;
- (2) It is desirable that the sales budget be based—to a varying extent, according to the circumstances of each case—on results obtained from market research ;
- (3) The direction, scope and objectives of the market research to be undertaken should be settled by the Board of Directors after careful consideration of policy, guided by economic and statistical data ;
- (4) Subject to the decision of the Board, the Sales Director (if any) or the Sales Manager, will be responsible for settling the methods to be adopted, including :—
 - (a) selection of a team of investigators—including such training as may be necessary ;
 - (b) compilation of the questionnaire—in the course of which it may be advantageous to hold an investigators' conference ;
 - (c) distribution of the questionnaire, and collection of the information ;
 - (d) checking, sorting, grouping and summarising the information ;
 - (e) preparation and submission of the report ;
- (5) A specially valuable instrument of consumer or dealer research is a well chosen and skilfully placed statistical sample, such as is taken in surveys of public opinion (*vide* results frequently published in the Press), in the Government's Social Survey, and in the B.B.C. Listener Research.
- (6) Market research is not lightly to be undertaken. It calls for great skill and wide experience and, like industrial research, cannot usually be carried out satisfactorily by small concerns, and hardly even with full effectiveness by medium-sized ones. In such cases the risk of failure is considerable, and its penalties are severe. As in industrial research, there are specialist firms which undertake such work on behalf of clients who, for one reason or another, are not well placed to conduct it for themselves.

The principal tool of market research is the questionnaire. Questions therein should be so drafted that the answers can be given in simple terms, facilitating subsequent collation and interpretation. The questions are primarily instructions for the field investigators ; and the value of the answers obtained is likely to vary in direct proportion to the skill shown in selecting investigators and planning the investigation.

The following are the heads used in a normal questionnaire⁶⁰ in respect of a commodity in general use.

Who consumes the product; at what times, and how is it used?
 Which brand is bought, and is the same brand always bought?
 What quantity is bought, and how often?
 Which firm makes the best product?
 Why a certain brand is bought.
 The place and method of purchase.

Details about the consumer, *i.e.* social standing, *e.g.* class of house.

Other questions could be framed with advantage for use in special investigations, *e.g.* :

What effect would specific variations of price, if made, have on the demand for goods already on the market?

What are the prospects of sale of new products of which samples only are available? *

Answers to such questions are usually obtained from both consumers and dealers, but obviously the form of question will vary according to the purposes of each investigation. A reference to the measurement of market potentials is made in notes on The Sales Budget in Chapter VIII of Vol. I.

The problem of securing efficiency in channels of distribution can hardly be said to be susceptible yet to planned treatment. There is a good deal of support for a Census of Distribution comparable in scope with the Census of Production; and, until such a census is taken, the data essential to any constructive scheme are unavailable. An *ad hoc* Committee has reported on this matter, and Government action may be expected. In this connection it must be admitted that the institution of the Census of Production has not yet led to any widespread, large-scale planning of industrial activity, but it forms the basis for much exploration that should bear fruit.

Market research, on an international scale, however desirable, is not yet practicable.

The Incorporated Society of British Advertisers exists to advise its members on publicity in its more general aspects, but not to act in the capacity of advertising agents, whose functions extend, in the case of the more important agencies, to some measure of market research. The majority of advertising agents, however, seem to hold that market research is a function of the manufacturer.

BUSINESS FORECASTING

{Business forecasting may claim with some justification to stand for a scientific method of research into the exercise of

* But which could readily be produced on a commercial scale if the demand seemed likely to be satisfactory.

prophetic vision in matters economic. It should be no discouragement to its pursuit if the research phase shows signs of being protracted. Meantime something can be done to supplement the powers of intuition on which so much reliance has to be placed in dealing with data of economic phenomena. The science of measuring these data develops daily and, with all the intelligence available directed to this end, the art of interpreting the data will be gradually evolved, and business forecasting will become an integral part of competent industrial administration.)

For the benefit of the student concerned to understand something of the general conception of business forecasting reference may be made to W. Wallace's practical work ⁷² on the subject. Some quotations from this book will help to give the subject reality.

In order to make our treatment of the subject as practical as possible, let us look at it through the eyes of an ordinary business man. Further, let us take for this purpose a manufacturer producing a proprietary article and selling direct to the retailer, because he covers the activities of both the manufacturer and the merchant.

Let us assume such a manufacturer towards, say, the end of a calendar year, looking into the future. He is interested, if we may so put it, in the immediate foreground, the middle distance and the far horizon.

As regards the first, he asks himself what are likely to be his sales during the next three months? Is his current rate of production, together with his existing stocks of finished goods, likely to be sufficient to guarantee suitable delivery, or should he increase his staff, and his purchases, and build up his stock further? Turning to the middle distance, what are likely to be his total sales during the next twelve months? If he is making use of the latest ideas in business he will wish to prepare a formal "budget" for the coming year, based on a definite "sales quota"; which, in turn, will determine the whole of his purchasing, production and finance for the year. But even if he is not yet prepared to accept this recent development in full, yet he will still desire to arrive at some conclusion as to his probable sales, in order that he may calculate his fixed or overhead charges per unit of product. With a certain sum for materials and direct

labour per car, a motor manufacturer can produce, say, 10,000 cars in the coming year at a certain price. If he sees his way to sell more cars than this, he can reduce his price per car, which will in turn increase his probable sales. Shall he budget for 20,000; or on what figure shall he fix?

Finally, our manufacturer must form some conclusion as to the probable long-period growth of his business, in order that he may be guided on the broad lines of policy which he should follow with regard to business expansion. If his business has grown rapidly during the last few years, is this growth likely to continue, and if so, at what rate? Shall he plan to double his capital, his buildings and plant, or is the recent rapid increase in his sales only a temporary phase? If his sales have been falling off, is this due to a temporary recession in general business prosperity, or does it denote a change in taste or conditions pointing to the wisdom of developing other lines of product? What, in short, is the outlook?

In these circumstances the manufacturer will naturally turn in the first place to his own records showing the history and present position of his business. Foresight is said to be 90 per cent. hindsight; and, short of the gift of prophecy, the only way to forecast the future is to consider what, in similar circumstances, happened in the past. At first sight his figures may convey little; may, indeed, seem to disclose no intelligible trend whatever, and therefore throw no light on the future. A little simple statistical treatment should, however, help matters.

There are ups and downs which seem to follow no guiding principle. Even, however, at this first stage, certain things appear, namely, first a general tendency for sales to increase over a period of years; secondly, a series of short "wave" fluctuations, and thirdly a series of longer, so to speak, "tidal" fluctuations. This brings us right to the heart of the matter. The curve of sales of any business will tend to show the following types of variation, namely:

1. The *secular*, or long-time, trend representing the gradual growth or decline of the particular business.

- ✓ 2. *Seasonal* or similar periodical variations, characteristic of the industry.
3. *Cyclical* variations, reflecting the wider tides of business in general.
4. *Special*, accidental and other erratic variations, due to special events such as war, industrial stoppages, earthquakes and other natural events, and so on.
5. Short-period changes *peculiar to the business*.

The first step in forecasting the sales of an individual business is to endeavour to disentangle these various movements. If we can do so, we shall have materially advanced our chances of successfully forecasting future sales. Of course, this information by itself will be insufficient; it will have to be combined with an estimate of the attractiveness of our product, in character, quality and price, in relation to those of competitors, depending in turn upon our relative efficiency in design, production, marketing and advertising.

If economic history were simply a record of accidental and unconnected events, then obviously any so-called forecasting would be matter of the purest guesswork.

However, life is not a series of accidents, but of causes and consequences; and this is as true of business as of any other aspect of life. When, with the development of industrialism, there came periods of intense trade depression, with resulting suffering and loss, economists began to give the subject exhaustive examination. As a result, they soon demonstrated that there was an up-and-down movement in business which followed a definite sequence or "cycle" of events, and which therefore we call a "cyclical" movement.) The cycle is something like this. Business has been depressed and is just beginning to recover. Prices, which have for some time been falling, now begin to show stability. Over-heavy stocks are diminished. Money becomes cheaper. A feeling of confidence begins to take the place of previous pessimism. Orders begin to be placed in greater volume, production is increased, and some of those unemployed are absorbed into industry. Their wages serve to swell the volume of purchasing power, the industries supplying their needs are benefited in turn, and the process is accelerated. Production is further

stimulated and profits and wages rise. The increased purchasing power circulates at a faster rate. Confidence grows into optimism. Advantage is taken of low costs not only to replenish stocks but to build new factories and new means of transportation. This, in turn, stimulates other industries, including those supplying raw material; and the movement gathers momentum. Under the pressure of demand, prices tend to rise. At first this is checked by the reserve productive power which is available, but, as men become more convinced of the reality of good times, larger and larger orders are placed, credit is extended, and prices rise. Unemployment is reduced to a minimum, the sufferings of recent years are forgotten, and the pace quickens. Soon a boom is apparent, stocks are increased, prices rise more rapidly, profits rise, and caution becomes the exception. Then a crisis is reached, financial conditions become strained, money rates harden, and credit is restricted; possibly some spectacular bankruptcy takes place and a panic results. Whether this last be so or not, there occurs a slump. Orders are cancelled, goods are sold at a loss to provide liquid assets, and prices begin to fall. Falling prices stampede business men generally (and particularly speculators) into realising while they can still do so without serious loss. Their selling accelerates the fall. Banks, which see their margin of security disappearing and which are themselves in need of cash, call in their loans, or refuse to renew those expiring, which in turn forces still others to sell for what they can get. Buyers hold off. Production is at once contracted, unemployment rapidly increases, wages fall, profits fall or disappear, bankruptcies multiply and confidence goes. Economies are everywhere introduced and efficiency is increased. Slowly, after a period of realisation and readjustment, the bottom is reached and business steadies. The cycle is complete, and forthwith a new one begins, displaying the same major features.

*Business Forecasting.*⁷²

By way of widening the angle of vision a quotation is given below from the writings of J. A. Crabtree⁴ and by slightly extending the quotation an interesting reference to "economic price" is included.

The popular function of Forecasting Services is that of

making definite forecasts of Trade. This function is usually the most impressive and unreliable part of the service.

The less impressive function, which is more helpful—in that it is more accurate—is the concentration and presentation of statistical data upon trade, prices and the like. Unfortunately we know very little as to how such data can be utilised in actual business experience, and there is great need for closer co-operation between economists and business men so that such a technique may be evolved. At present we work in loneliness; there is little or no exchange of experience, with the result that the work of our generation will be buried with our bones.

The various economic indices (trade, finance and price) have a much greater value to an individual business than is generally recognised. Their study often helps to counteract the mental impressions which come from the study of one's own affairs, and cases the strain of acting contrary to the psychological wave of the moment.

Indices may go far in helping to decide matters of important policy, or in suggesting some solution to specific problems of management. The great difficulty, however, is that little is known of the actual methods in practice of applying indices to specific problems, and each business man has to evolve his own. That is not easy. It calls for a tenacity of purpose, driven by the conviction that somewhere there is economic data available that will solve his problems if only it can be found and equated to his own difficulties. An enormous amount of investigation and experimental application is required, but the time and effort are always worth while, for the immediate solution saves much more time in approaching subsequent problems than it ever took to discover. Above all, it gives consistency to a business policy.

A specific example, which raises a question of fundamental business policy, is the use of price indices by a manufacturer for the determination of his selling prices. There are three ways of pricing a manufactured product; these are, (a) on the basis of cost, (b) at the "economic price," or (c) by guesswork. Six years ago we decided that certain of our products

should be sold irrespective of cost at the "economic price." * The problem was to discover the "economic price," for this is not calculable except on some economic theory. It was our conviction that the price of any product does not depend entirely upon prices in that industry, but rather upon the trend of purchasing power in the community—including foods as well as materials.

The term "economic price" is probably not the ideal expression, but unfortunately in business we have to use terms in the early stages of an idea to express what we are "trying to do." The term remains, becoming a part of the internal language and documents of the organisation, and to change it is almost impossible.

For the purpose of our example, we understand the "economic price" to be such price as will maintain a constant competitive suction upon the purchasing power of the whole community. The "economic price" must be considered as being the price for the service which the product renders to the purchaser. The product itself may require to be changed or adapted to maintain a constant competitive suction.

The "economic price" may vary as between one business and another in the same industry, each business having a distinct economic price-level for its product (e.g. Morris and Rolls-Royce).

*The Utility of Trade Barometers.*⁴

The student is in this way put in a position to visualise some of the dominant aspects of business forecasting, without being asked to consider questions of technique in a field of work that only the trained economist and mathematician can be expected to traverse with any assurance; and indeed even such experts do not all hold identical views as to the significance of individual items of data. Ultimately these conflicts of technical opinion will be composed and the layman will be able to appreciate the agreed measurements, just as he is already able, for instance, to understand something of the nature of vitamins in food without necessarily having much idea of how they came to be discovered and the degree to which they are at present measured.

* See p. 145.

MANAGEMENT RESEARCH

In the conduct of management research, the principles stated and defined on pp. 167–171 should be followed.

Research into the sectional aspects of the functional activities integrated by management, and considered briefly in this and other chapters of this book, is a part of the activities of the professional bodies whose members are responsible for the exercise of those functions. Research into certain other matters closely affecting industrial management is undertaken by many bodies, among which may be mentioned the National Institute of Economic and Social Research, the National Institute of Industrial Psychology and the Royal Statistical Society.

(Management research is concerned with enquiry into the best methods of co-ordinating and integrating all the many activities which go on simultaneously in any industrial undertaking; with problems of development other than those coming under market research and product development; and with special investigations into other selected matters. As such, it is the care of bodies such as the British Management Council, the Industrial Management Research Association, the Institute of Industrial Administration and the Management Research Groups (and later on it will be the care also of a British Institute of Management) in this country; the Institutes of Industrial Management in Australia, Canada and New Zealand; and the American Management Association, the Society for the Advancement of Management, and other bodies in the U.S.A

Although there is an International Committee for Scientific Management, which organises International Management Congresses triennially and publishes the resulting Proceedings, there is no international body conducting large scale day-to-day management research. Such a body (The International Management Institute) was set up under the League of Nations at Geneva in 1926. For about seven years it did excellent work, but unfortunately had to close down in 1933 because of the withdrawal of the financial support on which it depended, due to the calamitous deterioration of international relations characteristic of the period.

An instrument of management research which may be used with great benefit within a commercial or industrial undertaking or a nationalised industry for the detection and correction of its weak points and the further improvement of its

strong ones, is the management audit of which T. G. Rose ⁶² has written. Whether a management or efficiency audit should be conducted annually, or at longer or shorter intervals, or on the lines of a perpetual stock inventory, need not here be debated; but obviously every phase of a business, and not only the financial aspect prescribed for by law, should be regularly investigated and brought into correct alignment with current policies, developments and requirements.

Industrial waste,* as described by G. S. Mason,⁴⁴ is the kind of problem into which continual investigation should be made. Visible waste of material is sometimes only too obvious. Waste of time † may result from, *e.g.*, faulty planning, the use of defective methods and movements, lack of training, or deliberate slacking. Waste of money may result from, *e.g.*, mistaken policy in buying, over-production, bad design, or from a hundred and one other errors. The most difficult of all waste to detect, however, is that of ability. Square pegs are put into round holes, and *vice versa*, through failure to understand the full potentialities of departmental managers, under-managers or supervisors, and want of knowledge as to how to advise them to cultivate their abilities to the full, all of which result in frustration and wasted effort. Intelligent investigation would bring to light these and other types of waste, and their correction would be of immense benefit to the undertaking.

Perhaps only the larger businesses may be able to afford the expense of retaining the services of a competent person or staff whose whole time would be employed in carrying out such investigations; but smaller concerns might be able to arrange for similar services through their Trade Associations, or by pooling their resources locally. Such enquiry, directed to the investigation of existing policies and practices, would constitute a very effective exercise of the Development function in this direction. Obviously, in order to be effective it should be undertaken by reasonably qualified persons. These are not numerous as yet, but valuable qualifications for such work may be acquired by undergoing the courses of study prescribed by,

* See p. 81.

† Many a man can honestly echo, as an individual, the poignant if apocryphal *cri du cœur*--“Lost yesterday, somewhere between sunrise and sunset, two golden hours, each set with sixty diamond minutes: no reward is offered, for they are gone forever.”

and passing appropriate examinations of bodies such as the Institute of Industrial Administration, the London School of Economics, the Manchester College of Technology, and the School of Economics, Dundee.

SOCIAL AND ECONOMIC RESEARCH

In discussing Market Research and Business Forecasting, it was noted that for their full effectiveness both depend on the availability of an adequate body of economic measurement. The National Institute of Economic and Social Research, and various faculties of our Universities, have done good work in this direction; but social research has not received the attention which its great importance deserves.

A Committee on the provision of Social and Economic Research, appointed to consider "whether additional provision is necessary for research into social and economic questions," presented a Report in June 1946. After commenting on the position as they found it, they suggested the setting-up of an official Social and Economic Research Council and made certain recommendations. The Report was published as a White Paper in July 1946 (Cmd. 6868).

A competent Council of this type, provided with reasonable financial resources, served by an adequate staff of able investigators both intra-mural and extra-mural, treating their task as one of the greatest urgency, placing first things first and publishing reports at short intervals, could be of inestimable service to successive Governments and to the welfare and harmonious development of the community in general and industry in particular.

INDUSTRIAL HEALTH RESEARCH

In the sphere of personnel efficiency there are important agencies at work to improve the lot of those engaged in industry. A study of the 1932 *Annual Report of the Chief Inspector of Factories*²⁶ will show how effective towards this desirable end is the influence of the Home Office administration of the Factory Acts. There is, further, an independent official body, under the direction of the Medical Research Council and known as the Industrial Health Research Board, which serves to provide a scientific basis for possible further industrial action than falls within the scope at present of the Factory Acts.

It publishes periodical Reports. The following quotation from that dated 30th June, 1932, will serve to indicate the objectives of its work :

The Terms of Reference of the Board are, to suggest problems for investigation and to advise upon or carry out schemes of research referred to them from time to time by the Medical Research Council, undertaken to promote better knowledge of the relations of hours of labour and of other conditions of employment, including methods of work, to functions of the human body, having regard both to the preservation of health among the workers and to industrial efficiency; and to take steps to secure the co-operation of industries in the fullest practical application of the results of this research work to the needs of industry.

The modern conditions of industry with which the Board are concerned are mainly those brought about by the increasing use of machinery for carrying out functions previously performed by human labour. Mechanisation, which has done much to ease the physiological burden in the so-called "heavy industries," has at the same time transformed many of the lighter manual processes into mere machine-minding functions. This change in the conditions of human labour has been associated with an increase in psychological problems due to the demands which the new mechanised processes tend to make on the mental adaptability of the worker.

Repetitive processes, even when highly skilled, are liable to set up definite human reactions, notably those associated with monotony, speed, corporate and individual activity, and loss of creative satisfaction.

The Board investigate not only these and many allied matters, but concern themselves with some of the more general problems of industrialism. Health depends on successful adaptation to environmental changes, and as these are now taking place very rapidly it is necessary to inquire to what extent they are giving rise to new problems of industrial hygiene.

Noise, vibration and dust are inseparable from many industrial processes, but whereas dust is an objective reality, noise and vibration have subjective effects which are difficult

to assess. It is these and analogous subjective abstractions which are among the most complex of our modern industrial problems, and the psychological questions raised are as important as the physiological aspects. Employers and employed must be well informed on such matters, since a wise evolution of economic policy is otherwise impossible.

The life of the industrial worker must be regarded as a whole; economic, domestic and occupational questions must all be placed in their proper perspective.

The field of study is widening and increasing in importance, since, in addition to the foundations already laid by the Board, study of the whole environment of the worker is an urgent necessity. Leisure, intellectual development and education have their repercussions on health, and it is insufficient to study stimuli without examination of the subject stimulated. Hence, in evolving a conception of industrial health, we have to deal simultaneously with physiological, psychological and general environmental factors.

The contributions of the Board, therefore, towards the solution of these human problems can be conveniently discussed under the following headings :

(1) Industrial Surroundings.

- (a) Atmospheric Conditions (excluding Dust).
- (b) Lighting.
- (c) Noise.

(2) Methods of Work.

- (a) Physiological Aspects.
- (b) Psychological Aspects.

(3) Industrial Unfitness.

- (a) Sickness and Absenteeism in general.
- (b) Occupational Sickness.
- (c) Accidents.

(4) Selection of the Worker.

1932 Report of the Industrial Health Research Board.²⁷

INDUSTRIAL RESEARCH

Particularly in regard to industrial research, the ratio of expenditure in Great Britain has been compared most unfavourably with that of its main rivals. Several factors have

tended to discourage systematic expenditure on long-term and costly investigations in this field. Among them may be mentioned inertia and lethargy; the very natural aversion of the "practical" man from any activity that does not produce immediate saleable results; the effect of financial legislation in discouraging expenditure on research; and the desire of shareholders for dividends, which inclines industrialists to be opportunist and to lay plans for present profit rather than for future development. A concern needs to be very prosperous, and to have proved the profitability of research, before adequate expenditure on it can be made without protest from those chiefly concerned with dividends, partly because shares are often held as temporary investments to be sold whenever the time seems opportune, and partly because the rewards of research are often uncertain.

True as may be the contention of the following quotation, it nevertheless takes a good deal of unpaid time, coupled with unusual gifts, to rise above the attitude of which complaint is made. Perhaps for that reason, however, the reward is all the greater for those who do make the requisite efforts and succeed.

"It may seem easier to make progress by proxy, to let the other man test the new idea, then nip in and imitate him. But that does not work out in practice. The imitator is always behind. He arrives in the market a little bit late. It is a second-rate life existing on secondhand ideas, and a second-rate life produces second-rate ability. Experiment implies courage, and courage is the great attraction, the great guarantee." ("Callisthenes" in *The Times*, April 14, 1933.)

The general case for industrial research was put by Sir Frank E. Smith⁷ in a lecture delivered in 1932 under the auspices of the British Science Guild, which has worked so effectively to stimulate understanding of and interest in "science" and in the application of scientific method in all branches of human endeavour. The following extracts are taken from this lecture.

"For its size this country is the most highly industrialised country in the world and for generations we have been a nation with a large export trade. Centuries ago the population was comparatively small and enough food could be grown to feed all the people. To-day, for four days in every five we purchase our daily bread from overseas markets,

and in these markets we must sell our manufactured goods, our raw materials such as coal and our services such as shipping, banking and insurance. Otherwise we cannot pay for our food and the raw materials we require. In this respect we differ from other countries. America and most European countries are either wholly self-supporting or very nearly so."

"For years we have imported between 400 and 600 million pounds' worth of food per annum. In 1931 our imports of food, drink and tobacco were valued at 417 million pounds. In 1929 the value was 535 million pounds. Every day in 1932 we imported on an average food of the value of over one million pounds. Every hour £48,000 had to be found in cash or in kind to pay for the food we imported from abroad."

"Next consider our exports. In 1931 exports of articles wholly or mainly manufactured in this country were valued at 292 million pounds, not nearly enough to pay for the food alone which we imported. Worse still, we must set against these exports 262 million pounds' worth of goods of a comparable nature which were imported. Of raw materials and articles in the main unmanufactured we exported 47 million pounds' worth, but our imports of such goods were valued at about 173 million pounds. We must pay for our food and other imports by our exports, visible and invisible. In the past we have done so; if we are to do so in the future our manufactured products must continue to be as good as or better than those of our competitors and our prices must not be higher. It is obvious that increased mechanisation and increased use of knowledge are essential if we are to succeed; research will not only make our goods cheaper in terms of labour, but more abundant. There are some who do not encourage two blades of grass to grow where one grew before, but even these would hesitate to go back to the old spinning-wheel with a spinner spinning but one thread at a time. The mechanisation introduced by Arkwright had effects more far-reaching than much of the mechanisation of to-day; it not only reduced labour to less than one-fifth of that formerly employed, but also reduced the price of

woven fabrics so that even the poorest people could afford them. Similarly the mechanisation of to-day is enabling poor people to buy goods which would otherwise be beyond their reach. Increased production with the same amount of labour means increased power to exchange our goods for other goods, and the special position of this country necessitates that we shall have this power of exchange. Mechanisation has provided the people with good food, good clothing, good sanitation, and many pleasure-giving devices. There may be a marked dislocation of economic machinery, but let there be no brake on scientific and industrial progress."

"Organised industrial research is of comparatively recent growth. In the past, progress resulted in two ways; one by the isolated research activities of such exceptionally gifted men as Watt and Faraday, and, of more recent times, Parsons, and the other by observations of difficulties in processes and the surmounting of the difficulties by trial and error. Many of the older industries such as that of iron probably originated through the accidental production of fused products when fires were made. Examination of the products and intelligent deduction resulted in man being able to obtain many metals from their ores and to work them into articles useful to him. In fact man by observation and not by research adapted for his use many of Nature's raw materials which he could see, handle and work.

It was Roger Bacon who first urged the experimental method in gaining knowledge, and Gilbert, three hundred years afterwards, became famed for his experimental work, especially in magnetism. Galileo was a contemporary of Gilbert's and also favoured the experimental method. These great men saw quite clearly that what we to-day call experimental research is essential for the understanding of things and that there are other than material things which are worthy of study. Certain it is that if the air, the products of the earth, the water, and the radiation from the sun are to be used to the best advantage, we must know more of the nature of these things. Black, James Watt and others found out much about the nature of steam, and in the invention of the steam engine the first great revolution in

industry took place. This revolution, so great that no industry does not owe a debt to it, was the result of experiments and not mere observations of daily processes."

"We leave the past and come to the present.

"To-day there are industrial research laboratories in most civilised countries, and the marked increase in industrial efficiency, the plenitude of manufactured goods and their comparative cheapness is largely due to the work of these laboratories. The clothes we wear, the soap we wash with, the food and water we eat and drink, the trains and cars we travel in, the spectacles we see through, the illumination of our homes, and the hundred and one of our daily contacts are better than they were ten years ago and in ten years' time they will be better still, thanks to pure and applied research. In the past, industry progressed by methods of trial suggested by experience; to-day the more advanced industries are based on accurate scientific knowledge.

Most people admit that it is good for the motor-car to become better and its tyres to be cheaper and have a longer life. It is also well for electrical supplies to become more general, more efficient and less costly. It is even good for simple things like our pocket knives to be improved by research and become better and cheaper. But there are still many who believe that in the mundane things of life such as coal, cast iron, bricks and blankets, finality has been reached, or nearly so. However, a survey of what has been done and of the knowledge available and not used makes it practically certain that there is no product of any kind which cannot be improved in quality and produced more cheaply by properly conducted research. There is no limit to knowledge and there is no limit to technical progress. If a country had to choose between new knowledge and gold with which to fill its vaults, the wise choice would undoubtedly be new knowledge, for with it the gold can be obtained, whereas without it the gold will be lost. I believe it to be essential for our industries to avail themselves of existing knowledge and to conduct research on an adequate scale to acquire new knowledge."

“In Germany the central organisation for research is the Kaiser Wilhelm Gesellschaft, which administers thirty scientific institutions known as the Kaiser Wilhelm Institutes. These are supported in part by the Government and in part by industry. In addition there is the Physikalisch Technischen Reichsanstalt on which our own National Physical Laboratory was largely modelled. Private industrial research is conducted on an extensive scale by the chemical and dye manufacturers, the electrical groups, and by Krupp.”

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“In the United States information is much more complete. Mr. Maurice Holland, the Director of the National Research Council, states that ‘nearly three-quarters of a million dollars are spent every working day in the United States to improve the manufacturing processes, reduce production costs, and develop new fields of application of by-products. An increase from 500 industrial research laboratories in 1921 to over 1,600 in 1930, a 220 per cent. increase in nine years, tells the story of this new economic trend.’ ”

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“Japan is definitely setting herself the task of reorganising industry on scientific lines and has 69 research institutions working on problems connected with agriculture and industry. Of these, 45 are under Government auspices. The Institute of Physical and Chemical Research is a new Institute with an endowment of 3,250,000 dollars, of which the Government contributes one-half. This Institute employs about 500 people and is the nearest parallel in Japan to our National Physical Laboratory.”

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“In Great Britain we have not stood still. Imperial Chemical Industries; the General Electric Company; Metropolitan Vickers; the British Thomson-Houston Company; Brown-Firths; the Tootal, Broadhurst, Lee Co.; Hadfields, and many other concerns have their own research laboratories. The largest of these costs upwards of £500,000 per annum. It is impossible to enumerate here the many developments due to these laboratories. They comprise apparently small things, such as a grease having negligible vapour pressure

in a vacuum, to bigger things like synthetic manures, non-creasing cotton fabrics, manganese steel and silicon steel. The latter alloy alone is estimated to have saved the world over £50,000,000 by reducing the energy losses in electrical transformers."

" But although the industrial research laboratory is becoming, to an ever-increasing extent, part of the industrial machine, there is with many industries far too much timidity and hesitation, and these must be overcome if this country is to retain her old-time supremacy in manufacture and export more manufactured goods. There are, of course, many difficulties. It must be remembered that industries in this country have not had the same advantages that have fallen to some other nations to instal modern plant and scrap the old. During the War, production plant was installed considerably in excess of peace-time requirements in order to manufacture machines of war; consequently, with the return of peace, practically every industry suffered from surplus plant. In addition, overseas markets for British goods contracted, partly as the result of the economic development of other countries during the War. With the best will in the world, therefore, British manufacturers were and are confronted with many difficulties. With these in mind, the Government created, in 1917, a Department of State entrusted with the encouragement of scientific research and with the fostering of the application of its results in industry. There already existed the National Physical Laboratory which was founded by the Royal Society in 1899. In 1918 a fund of £1,000,000 sterling was provided to encourage the industries of the country to undertake research. With the aid thus afforded more than twenty industrial research associations have been set up. The industries themselves have contributed about 1½ million pounds and more than 5,000 firms are connected with the research association movement."

" At this point let me say a few words about the efficiency of British industry. We are so fond of belittling ourselves that pessimism is often taken as a proof of knowledge. Certainly we are apt to forget the great things we have done

in the past and the great things we are doing to-day. It is refreshing to quote two American opinions on the subject of our iron and steel industry. Dr. Arthur Little, of America, said, 'The entire structure of the iron and steel industries would collapse if the contributions of British metallurgists were withdrawn.' Again, Mr. Schwab, who in 1931 received the Melchett Medal of the Institute of Fuel, said on that occasion, 'Every great process in the manufacture of steel has come out of Great Britain. America has helped in many respects in the development of the enormous outputs typical of that country, but with Bessemer, Martin and various other people the inception of great steel enterprises has originated in Great Britain.' "

"Similarly, in the engineering, chemical, textile and other industries, this country has contributed knowledge which, in the aggregate, is not equalled by any other country. We may well be proud, but the fact remains that our commanding position, due largely to the possession of a valuable natural source of power and some knowledge of how to utilise it, has been reduced by the development of other sources of power abroad and the increased technical knowledge of our competitors.

It is well to repeat that the nation's balance sheet can best be helped by increasing our exports of manufactured goods, and to do this an essential factor is increased technical knowledge—the knowledge which will lead to better goods, cheaper goods and goods in greater variety than ever before.

I think I cannot do better than close this section of my talk by quoting the words of Mr. Kenneth Lee, the Chairman of Tootal, Broadhurst, Lee & Co. In 1932, at the annual meeting of his Company, he said :

" 'Scientific research is not only a first-class investment for an industrial concern, but it is essential for any export industry if it is to live at all in an old country like England.' "

*Industrial Research and the Nation's Balance Sheet.*⁷

A description of the Government organisation for scientific research and development in Great Britain was issued as a White Paper in April 1944 (Cmd. 6514).²⁴ Great attention should be paid to so interesting and important a statement

and for the information of the student it is reproduced in Appendix B of this Volume by permission of the Controller of H.M. Stationery Office.

Broadly speaking, organised research may be considered as the making of provision for discovery—as a conscious drive toward a pre-determined goal. In the process, invention may be inspired or induced; occasionally it may result from mathematical deduction; often it stems from design; and very frequently it has happened through conscious or unconscious brooding on a problem without experimentation, or sometimes merely fortuitously. Some of the greatest inventions and discoveries have been made as the result of genius working single-handed with a minimum of equipment, finance and scientific training. That, however, is not an argument for adopting merely a Micawber-like attitude in this important matter.

Many businesses are far too small to carry a research department, and usually all that their proprietors can do in this direction is to try out as best they may, with the very limited production staff and equipment on the spot, any promising ideas which may occur to them; alternatively they may entrust this work to firms specialising in the pursuit of specific lines of research remitted to them by clients, but there are obvious deterrents to this practice; and it is of course open to small firms to take up membership of appropriate Research Associations. Medium-sized concerns may be able to afford one or two research assistants to pursue some specific line of research connected with certain of their products. Large undertakings will have no difficulty in conducting on an adequate scale both specific and general lines of research.

When the Further Education sections of the *Education Act* 1944 become fully effective, the small firm should be much better off in this respect, since the Act authorises the provision of facilities for research work of many kinds (not excluding management research) to be undertaken in Regional Colleges in collaboration with local Trade Associations. Expensive equipment will thus be available which otherwise could not be utilised by the small industrial unit. The statistical bureaux of the Staff Colleges will be an invaluable asset in this connection.

There is a certain deterrent to co-operation with research

associations by firms having their own research departments, in that these firms may be called upon to give much more to their business rivals than they can hope to receive from the work of the association. This, when true, is not so much a criticism of co-operative research as a reflection on the meagre financial support given by members not having their own research departments.

Another problem arises when a research association carries out a special research for a member firm with the material and financial aid of that firm. It is difficult for the association to withhold the benefits of this special research from the members generally, although they can hardly be said to have paid for it proportionately. Here, again, more generous support by all the member firms might obviate exceptional expenditure by one only. Some benefits percolate in due course to non-member firms who have paid nothing. Perhaps these live the really "second-rate life" referred to in the quotation on p. 68, and, as such, are the less likely to be formidable competitors.

(Industrial research is concerned with improving and finding additional uses for existing products, as well as with the discovery of new ones.) It is therefore essential that the staff employed should be well acquainted with the mechanical, physical and chemical properties of the materials embodied in new and existing products.

Whether industrial research be spasmodic or continuous, and on whatever scale it is conducted, for full effectiveness the principles of Investigation, of the Objective, of Experiment and certain others defined on pp. 167-171 must be followed.

Where available resources make it possible to set up an Industrial Research Department, the following procedure may be adopted :—

The Board of Directors will :

- (1) Decide as a matter of policy whether, why and when to set up such a department.
- (2) Settle, in the light of the information influencing that decision the direction, scope and objectives of the research to be conducted.
- (3) Determine the limit of expenditure, and hypothecate funds.
- (4) Appoint the responsible head of the department, who may be the Works Manager, the Production Engineer, the Chief Engineer, or the Research Director, and who should preferably be a member of the Board with some appropriate title.

Subject to the decision of the Board, the Research Director, or other appointed executive will be responsible for the :

- (a) Organisation of the Department, and its liaisons with other Departments of the business and with external bodies.
- (b) Selection of its staff, and any training that may be necessary.
- (c) Provision of apparatus.
- (d) Programme of work.
- (e) Preparation, and submission to the Board, of reports as to progress of the work and recommendations as to selection of results for design and development.

At first sight it might appear to be sufficient to make recommendations when the time seems ripe; but in addition a well-arranged weekly progress report should be made, to account for the running expenses of the department and to keep the Board properly informed of its activities. In the absence of such information the Board might not unnaturally tend to become insistent on premature production of results, apprehensive on the ground of expense, and sceptical as to the value of the department.

A less formal kind of progress report might be made with advantage in other quarters. Often there is nothing very obvious in the work of the research staff, who moreover tend to become absorbed in their job and, perhaps on that account, or by temperament, unintentionally to "keep themselves to themselves." In either case, the workers elsewhere in the concern may feel themselves to be out of touch with the research department, and tend to become doubtful of, or even to disparage, the value of its work. Such an unfortunate state of affairs should not be allowed to develop, or to continue if it exists. To some extent it may be prevented or remedied by arranging for effective liaison between the research, design and development staffs, by the giving (say, monthly) of papers or addresses by the Research Director or members of his staff, and by the publication of these papers in the House or Works Magazine.

Discovery or invention must be interpreted through appropriate design, and before the new or improved product can safely be made on a commercial scale, and placed on the market with confidence, it must be tested and perfected through product development. The successive stages are thus seen to be :

RESEARCH, DESIGN, DEVELOPMENT, PRODUCTION,
DISTRIBUTION,

as shown on p. 86.

Of these, the first three are best grouped under one departmental head or chief executive, *e.g.*, the Works Manager, the Production Engineer, the Chief Engineer, or the Research Director.

Invention Rights.*—Other aspects of invention that frequently arise are the determination of who is the true inventor and who is entitled to the benefit of the invention. Kenneth R. Swan,⁵ barrister-at-law, has written on the questions involved in the following terms :

It is often a matter of great difficulty to determine who is in fact the inventor. The original and novel conception underlying the invention may come from the chemist or engineer in charge of the department. It is he, maybe, who sets the problem to be solved, and suggests possible solutions, leaving his subordinate to try out the various means suggested, so that the work of the subordinate is little more than experimental verification. In such a case the true inventor is the person who envisages the problem and suggests the means of its solution ; not the person who proves it to be a practical solution by putting it to the test of experiment.

On the other hand, the suggestion may be only a vague tentative idea of the means of compassing the desired end, but conveying, nevertheless, the germ of the invention, though requiring research or ingenuity to evolve a practical process or useful mechanism for carrying the idea into effect. In such a case neither alone can claim to be the true inventor ; the invention is, in truth, a joint production, and the patent can only properly be granted to the two jointly.

Of course, where the whole inventive idea emanates from the subordinate, and the employer or chief contributes only the impulse to the invention by propounding the problem to be solved, the latter is not entitled to be joined as co-inventor, although the circumstances in which the invention is made may be such as to justify him, in the absence of express agreement, in requiring the employee to assign to him (the employer) the whole benefit of the patent when granted.

* See Vol. I, under *Patents*.

It has become increasingly the practice within recent years for employers to require all skilled employees who have to do with the technical side of any manufacturing business to sign an agreement containing some provision with regard to inventions. Of course, in the case of employees specially engaged for research work or for the purposes of devising improvements in processes or mechanism there would normally be an agreement dealing with inventions which arise from such work. I am not for the moment considering special work of this kind, but the case of the ordinary skilled employee from whom inventions are not normally expected, though the possibility of their occurrence is a matter to be reckoned with by the prudent employer. Such agreements take many different forms. I have seen agreements which provide that all inventions of whatever kind made by the employee during his term of employment should be the sole property of his employer, and, if patented, should be assigned to the employer without payment. I have grave doubts as to whether an agreement as broad and one-sided as this could be upheld in the Courts. Nor, again, is it satisfactory to have an agreement, as is sometimes done, in which the prospect of remuneration is held out to the employee, but the employer is made the sole arbiter as to whether the invention is deserving of special reward and as to the amount to be awarded.

To my mind the satisfactory arrangement between the employer and the ordinary skilled employee with regard to inventions is one which makes the following provisions :

(1) That the employee shall communicate to his employer all his inventive ideas.

(2) If the invention is one which is germane to the employer's business, the employer shall determine whether or not a patent shall be applied for. It may be that the invention is one which can most advantageously be used as a secret process. If, however, the employer wishes to have it patented, it should be obligatory for the inventor to apply for and to do his best to obtain a patent and assign it to the employer or grant the employer a licence to use the invention, but it should also be obligatory for the employer to reward the employee by paying him a fair proportion of the net

profit or saving realised by the use of the patented invention or secret process. What the proportion should be must, of course, depend on the circumstances of each case, but I should say that in the generality of cases 25 to 30 per cent. would be a fair proportion.* If no proportion is specifically mentioned in the agreement it should be left to an independent arbitrator to determine what the inventor's share should be.

(3) Inventions which are not germane to the employer's business, but which have been evolved by the inventor in the course of his employment, should also be communicated to the employer, and he should have the first opportunity, though not the right, of acquiring the invention. The terms of its acquisition would be a matter of bargain between the employer and the employee. If they cannot agree as to terms, then the employee should be free to exploit his patent as his own property and for his own benefit entirely.

Where the invention is not germane to the ordinary business of the employer, the employee would naturally wish to have some protection before disclosing his idea, and in this case he should be at liberty to apply for provisional protection, and indeed to proceed with his patent application without reference to his employer.

The foregoing are terms which I think would be suitable as between an employer and an ordinary skilled workman.

Where, on the other hand, an employee is expressly engaged for the purpose of devising new processes or machinery (as, for instance, in the case of a chemist or physicist engaged for research work) the terms of employment would normally be so arranged as to give him adequate remuneration in the form of salary for any inventions he may make, without making any additional payment or giving him any financial share in the profits of his inventions.

That is the assumption which the law ordinarily makes in the case of employees of this class, where no written agreement has been entered into at all. If the invention is the natural sequel of the work which the employee was engaged and paid to do, the law holds that the employer is

* A large proportion of patents are of the nature of "routine" patents. They are taken out as a general protection lest some competitor should secure an advantage by a prior patent. Questions of either profits or savings therefore hardly arise in such cases.—E. T. E.

entitled to the whole benefit of the invention. If, on the other hand, the invention lies outside the normal scope of the employee's duties, the invention and any patent granted in respect of it are, in the eyes of the law, the property of the employee.

*Development of Invention.*⁵

INDUSTRIAL DESIGN

Especially in the arts, and to an important degree in the sciences, design is the visible expression of idea. It is the far end, as product development is the near end, of the bridge between discovery or invention and commercial production. Design—including in the expression its concomitant specification—determines the appearance, composition, proportion, structure, functioning and economy of the industrial product, from muffins to Mulberry Harbour. Hence the more appropriate the design, from all relevant points of view, both of products and their containers, the greater the prospect of effecting satisfactory sales at home and abroad, particularly where the customer has freedom of choice.

Obviously the best possible design is essential for saleable products, but it is equally necessary, though not so obvious at first sight, that every item of the tools, equipment, machinery, plant and buildings used in their production should be of the most effective design.

In certain industries, design may be expressed in formulæ instead of by drawing, and the appearance of the product may be but little changed, if at all, however important the effect of the alteration in its composition. In all industries, reasonable economy of material should be a main objective. Lack of care or foresight in design may give rise to various forms of waste.* In component manufacture, for example, if unnecessary heaviness is permitted it will entail a consumption of material of which a proportion is wasted. Again, if design is not carefully adapted to satisfactory sizes already in use, material is wasted by unnecessary machining. Further instances of waste through faulty design are where ill-considered shapes and dimensions call for redundant processes and exces-

* See p. 64.

sive spoilage in manufacture, and where exuberant variety in dimension involves carrying too many sizes of raw material in stock, entailing more numerous purchases of smaller quantities at less favourable prices, and more complex storekeeping. All such defects hamper production, and consequently increase costs.

The probability of error in these and other directions is greatest where it is necessary to design a completely new product, or to adapt an existing one to a usage so novel that it calls for a clean break with tradition. Though theoretically it should be possible in such cases to work out a near-perfect design "by first intention," seldom in practice is this result achieved until after a long sequence of trial and error—many of each—as witness the history of the design of transport vessels and vehicles in the nineteenth century. Where, however, the designer is working on ideas for improvements in fashion, pattern, performance, or otherwise of existing products—whether in dress, decoration, or most classes of capital and consumer goods—he is on what should be safe because familiar ground; but even here there are frequent evidences of defective design in articles which have been in everyday use for many years.

Design (including specification) begins with the rough sketches and notes of the inventor or the research worker. These are elaborated in the design department or the drawing office, as the case may be, for the guidance and instruction of operatives in the development department or the works. The staff of a design department in, *e.g.*, a clothing or furniture factory, pottery works or textile mill is recruited largely from an art school or department, and the staff of a drawing office in an engineering works from the engineering drawing section of a technical school.

Formerly there was inadequate liaison between industry and the schools, to the detriment of both; but the setting-up by the President of the Board of Trade,* in December 1944, of the Council of Industrial Design,† and the promotion by that Council of Design Centres, are good auguries for the future. In the words ‡ of the President of the Board of Trade :

* The Rt. Hon. Hugh Dalton, P.C., M.P.

† Tilbury House, Petty France, S.W.1.

‡ In a letter to Sir Thomas Barlow, G.B.E., Chairman of the Council, 19th December, 1944.

“The functions of the Design Centres, whose activities the Council will co-ordinate, will be :

- (a) to study the problem of design in relation to the products of the particular industry ;
- (b) to collect and make available to the industry information relating to changes in public taste and trade practice in home and overseas markets and to hold exhibitions both at home and overseas ;
- (c) to conduct and encourage research and experiment in the design of the products of the industry ;
- (d) to co-operate with the Education Authorities and other bodies for the training of designers and in the provision of special equipment, prizes and grants, and to arrange factory visits and training in factories for art students.”

For fuller information as to this most promising development the student is referred to a brochure on Design Centres issued by the Council of Industrial Design.

Standardisation.—There is an aspect of development relative to design, materials and production that is not within the sphere of industrial research as ordinarily understood, *viz.* that of standardisation. Its far-reaching importance as an industrial principle is too little appreciated. Innumerable products are indebted directly or indirectly to it—perhaps hardly even the artist’s original work is unaffected. Out of standardisation applied to inventions and processes have come many of the widespread amenities of to-day, but there are still a multitude of directions in which its utilisation would be beneficial. Under the ægis of the present British Standards Institution, which grew out of the British Engineering Standards Committee, standardisation has been organised and extended in a very effective way. The following extract from the Institution’s 1932 Report ⁸ will serve to inform the student of its general scope and policy.

“The British Standards Institution is the National Standardising Organisation and issues the British Standard Specifications, and has three divisions ; Engineering, Building and Chemical.

It is an independent body in the closest touch with industrial requirements and modern technical knowledge with the fullest Government support, but free from Government control.

It co-operates with the Standardising Bodies in the various parts of the British Commonwealth of Nations, in accordance with the desire of the Imperial Conference for the closest co-ordination of all Standard Specifications issued within

the Empire, and the preparation of joint Commercial Specifications based on standardised and simplified practices prepared by agreement between any two or more of the countries in the British Commonwealth of Nations.

It is in direct touch with the Standardising bodies in foreign countries and participates directly or indirectly in the work of International Standardisation as and when industry so desires.

The original Engineering Standards Committee was formed in 1901 by the leading Engineering industries of the country, and from that committee of eight members the present organisation has grown, and now comprises some 600 committees with over 3,000 engineers and business men throughout the country who give their time and experience freely in this national work.

The Institution exists to assist British Industry by preparing British Standards Specifications, of which up to the present over 400 have been issued, exclusive of some 165 for Aircraft Materials and Component Parts issued in co-operation with the Air Ministry.

The British Standards Specifications are based on what is best in present practice (and do not attempt to attain an ideal which might be too costly to adopt) providing a generally suitable standard of performance, quality or dimension and an equitable basis for tendering. They help to eliminate redundant qualities and sizes, and enable manufacturers to provide stock during slack periods and purchasers to obtain their requirements more rapidly. The Specifications are kept up to date; they do not interfere with individual initiation and invention and they leave the producer as much freedom as possible in his methods of production. Wherever possible the Specifications deal only with performance.

The preparation of British Standards Specifications is undertaken when :

- (a) it is to fulfil a generally recognised want, *and*
- (b) the producers and users are prepared to co-operate, *and*
- (c) the funds necessary for carrying out the work are forthcoming.

The underlying principles covering the preparation of the British Standards Specifications are that :

- (1) They shall be in accordance with the needs of industry and fulfil a generally recognised want.

- (2) The community interest of producer and consumer shall be maintained throughout the work.
- (3) Standardisation shall be arrived at by general consent.
- (4) Periodical review and revision shall be undertaken to prevent crystallisation and keep the work abreast of progress.
- (5) There shall be no coercion whatever, either by legislation or by one section of the community over another section.

British Standards Specifications produced with the above safeguards do not bring about over-standardisation, and do not force on the community undesirable and unwise standards. They do not prevent the purchaser, if he so desires and is willing to pay the price, from obtaining special requirements.'

*1932 Report of the British Standards Institution.*⁸

In the period between the first and second world wars some progress was made by certain countries (in particular Great Britain, the Dominions and the U.S.A.) towards international standardisation. During the second world war some measure of standardisation of armaments between Allies was achieved, and this development led to the recent Conference between representatives of this country and those of the U.S.A. with a view to the adoption of common standards for screw-threads. Discussions have been undertaken similarly in connection with Machine Tools.

Another line of development in international standardisation is towards the attainment of some measure of common practice in relation to ordinary "capital" and "consumer" goods, and this might be undertaken with advantage by the United Nations Standards Co-ordinating Committee.

INDUSTRIAL DEVELOPMENT

Development and expansion of a business as a whole, whether or not due to conscious planning, should proceed from sound policies applied to all aspects of the business and expressed in smooth and effective integration of all its activities. Hence, though from time to time, according to circumstances, the greatest activity may be displayed in some particular direction—e.g., distribution, finance, production, or research—to ensure stability the advances in all departments must be as nearly as feasible parallel, proportionate and simultaneous.

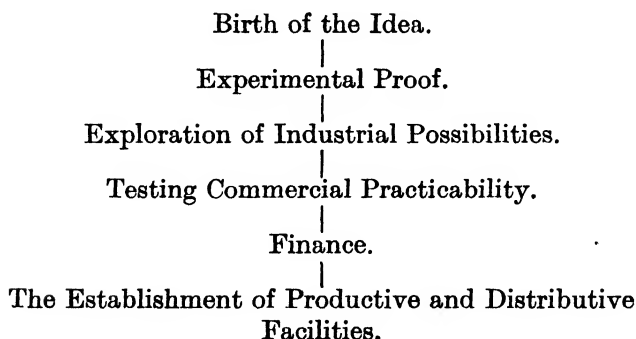
The direction, co-ordination and integration of all activities for the attainment of this objective are the responsibility of the higher management. Further discussion of this broad aspect of Industrial Development would be out of place in this Chapter, which therefore concludes with a brief reference to Product Development.

PRODUCT DEVELOPMENT

This is the near end, as industrial design is the far end, of the bridge between discovery or invention and commercial production—the stage through which, following more or less of research, invention and design, the product is passed in order that it may be developed to the point at which it is considered to be suitable for economical production, and likely to be attractive to the customer (in connection with the last-mentioned consideration, probably some preliminary steps in market research will have been taken).

Sir A. P. M. Fleming⁴³ has traced the stages of Development of Invention in the following diagram, and considers five years the typical period necessary for converting new knowledge into industrial application.

BRIDGING THE GAP BETWEEN DISCOVERY AND APPLICATION



In this connection it is relevant to call attention to the following extracts from the 1930-31 *Report of the Department of Scientific and Industrial Research*.³¹

“Some remarkable results, bringing substantial financial benefits to the industry concerned, have already been achieved by research associations, and it is quite possible

that the efforts of these bodies may at any time lead to the rapid development of a promising new industry or to the successful re-organisation of an existing industry through the use of new or improved materials or processes of manufacture. The outstanding difficulty, however, that all research associations experience to a greater or less degree is that of bringing home to their members the practical significance of the scientific conclusions that have been reached."

"Even, however, when the advantages of a particular result have been demonstrated on a full-scale plant there is frequently considerable delay before the new idea is exploited commercially by the industry. This may be explained on a variety of grounds. Not only may scepticism persist as to whether the new process will actually effect the economies claimed for it in commercial practice, but there may be a natural disinclination to replace expensive plant which is giving reasonable satisfaction, and which is far from being worn out. Moreover, the makers of a new machine would ordinarily be disposed to quote prices based on the number of orders they consider they are likely to receive. Until they have some indication that the machine will sell in large numbers they are usually not prepared to embark upon mass production. On the other hand, manufacturers who would be likely to make use of the machine if it was available at a reasonably low price are not prepared to purchase so long as the price remains high. Under the most favourable conditions the industrial application of research work involves much time and thought and expenditure. It has been stated by Sir Robert Hadfield that it took his firm twenty-one years to develop the use of transformer steel from the experimental stage to manufacture of the commercial article on a proper business basis."

"New industries are not in general created by direct scientific attack. They can usually be traced to remote origins. One conspicuous example to the contrary is the Bessemer process of making steel; another is the production of fixed nitrates, which was developed by direct attack under the stress of war conditions in Germany. A potential example is the Bergius process for the hydrogenation of coal. But the normal experience is illustrated by such industrial

developments as radio communication. The general public has been made familiar with modern developments by everyday acquaintance with broadcasting, but forgets that it is thirty-five years since Marconi lodged his application for the first British patent for wireless telegraphy, and is, in the main, unaware that the scientific origin of the radio industry of to-day is to be found in the middle of last century when Joseph Henry first produced his theory of the electromagnetic field, out of which grew the conception of electric waves, afterwards verified by the experiments of Hertz.

It is clear that the history of the relation between invention and industrial development promises no short cut to renewed prosperity. At the same time those interested in financing the development of new industrial processes might with advantage make more use than they do of available facilities for obtaining authoritative evidence on the technical performance of new devices."

"We feel there must be many who, with the best will in the world to apply the results of scientific research, are in some doubt of the means to be adopted in their particular case. To these our advice is first to examine in detail in the light of existing knowledge and with the help of the best scientific advice available, the whole of their manufacturing processes. Where this is not already periodically carried out, we believe such an examination will reveal methods by which improvements, perhaps small in themselves, but amounting on the scale on which modern industry is conducted to hundreds of thousands of pounds, may be attained. Sometimes it is the raw materials that may be found susceptible of improvement; sometimes the plant—either by the modification of existing design or by the introduction of labour-saving devices; sometimes a use may be found for a waste product; sometimes a modification of the actual process employed will be found to be required. This examination, joined with a knowledge of a distribution of costs of manufacture which the individual firm alone possesses, should indicate where future research can be most profitably employed."

*1930-31 Report of the Department of Scientific and Industrial Research.*³¹

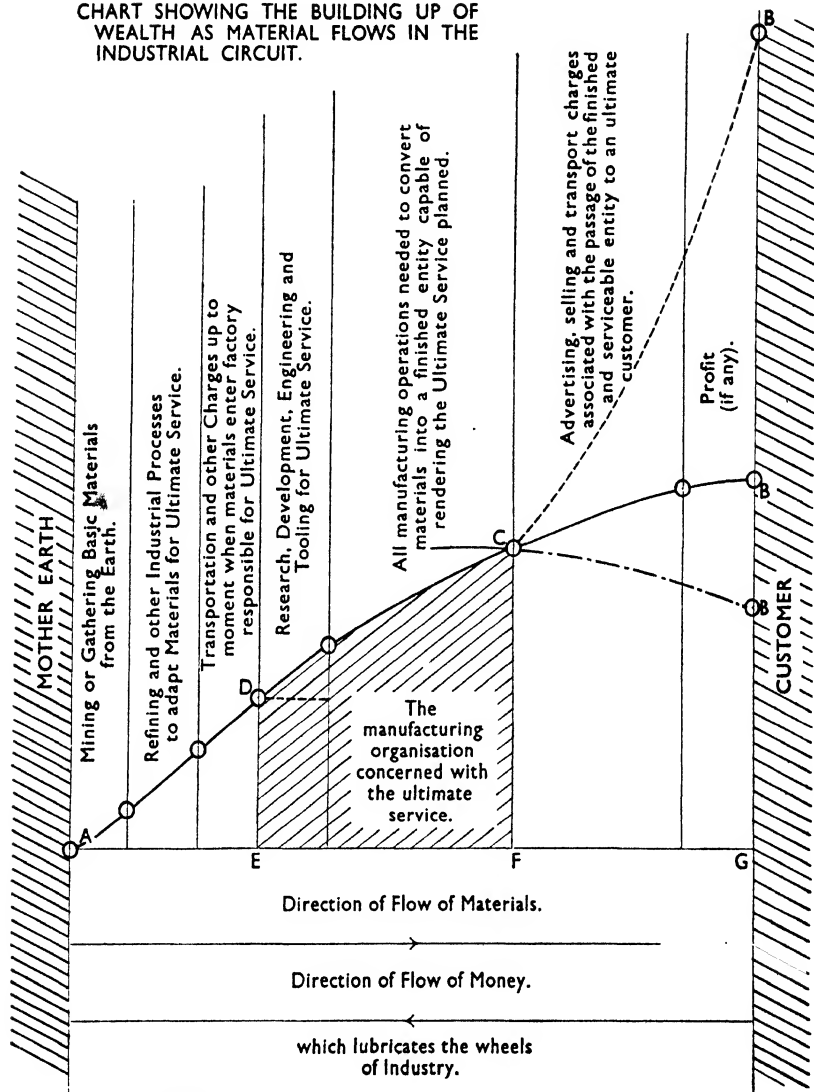
Product development, organised or unorganised, goes on to

some extent in even the smallest firms, but only the medium-sized and large concerns are in a position to set up special development departments. On whatever scale it is conducted, however, the objective of development work is the same. It consists in trying out and proving, or improving, new experiments, methods, processes and products; in the construction of models, prototypes and the like; in running them—to destruction, if necessary—to discover faults or to ascertain their probable life or utility; and, for these purposes, in setting up experimental laboratories, pilot plants, or whatever media are appropriate to the nature of the industrial undertakings concerned.

The nature of the product development work carried on will be more or less similar to that of the ordinary production work of the undertaking, whatever that may be. As the next Chapter deals with the organisation of production, it is only necessary to note here that, as that Chapter is concerned more particularly with organisation for engineering production, organisation for production in other industries—*e.g.*, agriculture, clothing, confectionery, gas and electricity, heavy chemicals, plastics, textiles—will naturally follow different lines which, however, are governed by the same underlying principles as those set out in Chapter IV.

A. P. Young ⁴⁷ has illustrated in an interesting and informative chart (Fig. 3) the whole cycle of the successive stages from the extraction of raw material, and its transformation into saleable products, to the distribution of those products to their ultimate purchasers, concerning which he says, "The diagram . . . is of interest as showing how wealth is built up in an industrial circuit, through the application of labour and energy to materials which are first drawn from mother earth, and by this continuous process converted into serviceable units. Whilst the service flow is from mother earth (A) to customer (G) the money flow is from (G) to (A). It is important to note that the ordinate DE gives the value of the materials entering the manufacturing organisation from outside sources; the ordinate FC, the manufacturing cost of the serviceable unit; and the ordinate GB, the price paid by the ultimate customer. The ratio $\frac{GB}{FC}$ may vary over a very wide range, and is a vitally important factor linked closely with the great problem of distribution."

CHART SHOWING THE BUILDING UP OF WEALTH AS MATERIAL FLOWS IN THE INDUSTRIAL CIRCUIT.



NOTE:—

DE = Price paid for materials by manufacturing organisation.

FC = Manufacturing cost.

BG = Price paid by customer.

FIG. 3.

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CHAPTER IV

ORGANISATION OF PRODUCTION

“ *There remains, however, the problem that if we are to have a higher standard of living it must mainly be by increasing the pool of production and lowering the cost in labour time.*

“ *How can this be done? First, by securing the best and most effective production methods, and secondly, by the worker giving a fair day's work for a fair day's pay.*”

Lord Latham in the *Daily Herald*, 20th August, 1945.

To the onlooker, the organisation of production would appear, in essence, to comprise the bringing together of equipment, materials and workers in such a manner that their selection, arrangement and use shall be suitable to the production of some commodity for sale. The efforts of the individual workers will naturally require direction by their leaders, the supervisors and managers, who arrange for the distribution of instructions, materials and tools. The precise character and lay-out of machinery and plant, constituting the equipment, will depend on the particular product to be made and the processes to be employed in its production. The organisation of an established works or factory is usually easily described, so that it appears obvious enough to a visitor who is being shown round by a competent and willing guide. Knowledge thus acquired is distinctly useful to the student and is worth considerable trouble to obtain. At the best, however, it can only be superficial because it is limited in very large part, if not wholly, to those physical features of production organisation which are plainly to be seen.

Without the necessary administrative or managerial skill to select and co-ordinate the equipment and personnel to a purpose that will be profitable, no scheme of organisation will succeed. It is therefore necessary for the student to understand and explore the many factors that enter into the determination of the purposes to be served by any production organisation, and the character of the problems that arise in

building it up. By acquiring this insight into what may be called the intangible features, he will cultivate the faculty of analysis and criticism and develop accordingly his power of administrative judgment. Experience of many kinds may be necessary to make the exercise of that power effective in terms of economic success, but by following the lines of inquiry to be advocated here the student must experience a degree of mental stimulation that will bring out whatever natural aptitude for organisation he may have, and will give it direction. It should be clearly understood that it is not practicable in the present book to enlarge on the actual routine through which production is made effective. In any case the routine would vary greatly from one works to another. Only the principles that should determine the routine can be usefully considered apart from a particular business. Whilst examples illustrative of correct principles have been selected from the best practice, some few applications are given which, without departing from sound principles, are believed to improve on the more usual methods.

(Organisation for production, or for any other function, can never be an end in itself. It is a means to an end,) and must inevitably be conditioned by the end or purpose desired. When a manufacturer claims that "his business is different," he may only be defending himself against persuasion that he should learn from other businesses, but he does, none the less, state a fundamental truth. Is it not stated that all men are different, and that no two blades of grass are identical? The differences inherent in various production organisations are due to variation in the considerations determining the exact purposes to be served, and to variation in the detail arrangements made to achieve those purposes. It is therefore inevitable that there should be no two businesses exactly alike—nor, if twin businesses were initiated in identical form, would they remain so for many hours; each would at once begin to take shape and colour from the personalities of those in charge.

None the less, it is possible to set out the main considerations that require, or are likely to require, attention in any business, and so to arrive at a method of approach to the problem of organisation or reorganisation, as the case may be. Each manufacturing proposition will thus, by process of analysis

and dissection, be resolved into its component factors, each of which can be weighed up on its merits, when decisions can be reached as to what to do and when and how to do it. These preliminaries being satisfactorily settled, the process of analysis can be reversed, and the complete organisation built up by a synthetic process, with the assurance that each element has been equitably considered and correlated to the organisation as a whole.

In putting this procedure into effect, allowance must always be made for the technical characteristics of the particular manufacturing proposition. This is because production considerations in different industries do not lend themselves to either a common terminology or treatment. Something can be done in this respect by agreeing beforehand, for example, that the term "Design" shall be understood to cover the form and constituents of the product, whether it be a drug or a doormat, a shoe or a ship. There are, of course, industries, such as coal-mining, where design of product—if it can be so called—is limited to specifying grading by size or other feature of the product, while in such an industry as the supply of electricity the design function finds a simple expression in the specification of the current.

: A second term, having a specialised significance in engineering, is "Tools." For the present purpose, however, tools need not be limited in meaning to cutting tools, jigs, gauges and the like, as used in connection with metal-working machines, but can cover equally well the lasts used in shoemaking, the moulds used for pottery, the harness used in looms, the "furniture" used for printing, etc. Tools, in short, represent the embodiment of craftsmanship, or the transfer of skill from the earlier craftsman to his implements, until to-day comparatively little personal craftsmanship is involved in using the tools now available to produce the high-grade product at a low unit cost. This applies more particularly when the quantities to be produced justify the expenditure necessary to obtain tools of this character, and afford the opportunity for their use being learned by workers who are not skilled craftsmen in the older sense. This country, however, is still rich in individual craftsmen who do not need to rely on highly developed tools, and it is largely due to this fact that job and batch production can still persist and take a vital part in supplying the needs of trade.

Machinery used for manufacturing might be described as tools of a larger order driven by power. This is recognised in engineering, where metal-working machines are known as machine tools. For the uninitiated it should be explained that machine tools themselves work by using cutters, drills, etc., which are tools in the sense referred to above.

The further point may be made that tools can be classified as "standard" when of general utility in the manufacture of a variety of products, and as "special" when designed for use in producing a particular product.

Before coming to close quarters with the organisation of production it is necessary to discuss the factors entering into production policy, by virtue of which a production programme is evolved.

PRODUCTION POLICY

(The initial consideration in the determination of production policy is the degree of permanence possessed by the market to be catered for; whether trade in a particular design of product will be possible for a brief period only, as with fashion goods, or continue, to more or less standard designs as with, say, a pedal bicycle. The second consideration is that of the finance available for the purpose of carrying through a production programme appropriate to the volume and conditions of trade expected; in other words of the time required before output is available for delivery, and the stock to be held. One of the more serious factors entering into the question can be the delay and expense incidental to the correction of initial errors in product design and material after processing has commenced. These troubles may equally arise from unsatisfactory tool design. To the uninitiated it is astonishing how weeks, and sometimes months, can be lost through unforeseen contingencies during the initial production of a new design of product.

Given that these basic considerations are borne in mind, the various factors which call for investigation before a production policy can be formulated may next be discussed. They are :

The repetition factor.

The range of products.

.. Degree of standardisation.

Quality of workmanship.

Quality of material.

The Repetition Factor.—This aspect easily dominates the whole position by its influence on the production cost per unit of product (a cost that is made up of preparing for production, of obtaining material, and processing it), and on the arrangements generally for production. Its more obvious influence is in the field of production preparation costs, such as those of design, specification, schedules, patterns and tools which either are necessary before production proper can be started, or serve to reduce the processing costs per unit of product. In this connection there are three well-marked phases :

(i) *Job Production*, where each job or order stands alone and is unlikely to be repeated in all particulars, as in the notable example of the hull of a ship. All production preparation costs peculiar to the job must therefore be recovered in its selling price, as none of these costs can safely be carried forward to be spread over subsequent orders.

(ii) *Batch Production*, where there is a probability of repetition of orders (but not of continuous production), so that more extensive arrangements for reducing costs of production per unit can be justified, because they can be spread over a larger volume of production than in the case of job production. Batch production differs from mass production in that there is not continuous production of products of strictly identical character. It is, however, possible, as in shoe manufacture, to have production that is batch production in certain respects as to material to be used, but which, owing to the processes themselves for different batches being substantially unchanging, approximates to conditions of mass or flow production.

(iii) *Mass or Flow Production*, where products of strictly identical manufacture are in continuous production, i.e. each processing unit (machine or hand) remains employed on the same product without any change to some other product. These conditions perhaps never occur completely; because some machines may produce so much more rapidly than others that such machines may be utilised for other products from time to time, or left standing until wanted again. Continuous production, when it is possible, is likely to justify almost unlimited expenditure on labour-aiding devices such as jigs and fixtures, and on motion and time study : it should occasion a maximum efficiency on the part of process workers, on the contention that

“practice makes perfect,” if the possible deadening effects of monotony can be suitably guarded against.

Range of Products.—Obviously the range of products is likely to be at its maximum under job production and at its minimum under mass production. The extent to which this is true must depend on the differences in product that are recognised. It is possible, by means of standardisation, to have a range of products that vary only in the particular combination of standard parts which constitutes the final assembly. Again, a range of products may connote any medley of products that it is possible to make with the plant available, the underlying idea of such a range being, no doubt, to catch any sort of order that will keep the wheels going. This might be claimed to be a genuine sales policy, but cannot be considered a good production policy. Nevertheless, so many strange arrangements have enabled profit to be made that criticism must be guarded. The most serious defect of a haphazard policy as to range of products is that, without a suitable degree of specialisation, it is not possible to afford the proper attention to either design or production methods necessary to meet competition. The history of the British Machine Tool trade up to a comparatively few years ago was one of maximum range and minimum specialisation, whereas in the U.S.A. the reverse policy of minimum range and maximum specialisation was followed very successfully—to the detriment of the British trade. British production is now more specialised; while, to permit a wide range of products to be offered through one selling channel, a number of specialist manufacturers have combined.

Degree of Standardisation.—The further standardisation in design or dimension is carried, the more can production be facilitated; notably by permitting the use of standard tools having application to many products or parts of products—as distinct from the need for special tools having a severely limited application, for which reason they are probably of higher individual cost. It is standardisation of dimension that permits the possibility of mass production in shoe manufacture referred to above; because, by providing templets and lasts of various standards, the effect of standardisation is obtained owing to the character of the processes used. Again, in a textile factory, the work of the loom tacklers in making a loom ready for a new design affects the total cost of each run of work considerably

where the basic design changes, as well as the colours used. Hence, the tendency is to produce the same design in a number of colour variations. The same considerations apply to wall-papers printed from carved wooden blocks.

‘Standardisation involves a very important aspect of design, particularly in engineering.’ The tendency hitherto in British engineering has been to design for performance or service rather than for production. Designing for performance has reached a very high level and reflects great credit on the engineering schools. But designing with an eye to production as well as performance has been too little considered until recent years, and it is the great hope of British engineering that the proper blend of the two aspects is likely to become general.

There are now in many drawing offices two definite divisions or stages in design. The first stage is to design for performance or function. These functional drawings are then passed to the next stage for the preparation of working drawings which pay definite regard to facilitating production. As long ago as 1890 an English engine-building firm (still prominent) applied this principle to the use of partly standardised components, *e.g.* certain features or dimensions were selected from an approved range, and new sizes admitted to the range only after thorough discussion. The effect of this was to minimise and largely obviate the necessity for special tools for a new order. In those days there was very little repetition of orders that were identical in all parts, but many advantages of standardisation were obtained in production without detriment to the development of design. It is this attitude that inspires the work of the British Standards Institution to-day. An outstanding example of pioneer work in this connection is the standardisation of screw threads and nuts carried out by Whitworth as far back as 1840.

Designing with special regard to production may not only minimise preparation expenditure and reduce net production costs, but where goods are made to order, as distinct from being made for stock, hardly less important gains may follow from greater rapidity of completion. Actually, any method that shortens the production cycle from the rough material stage to the tested final product not only results in better service to the customer, and so helps sales, but minimises the period

during which money is unproductive in the form of work in progress. To make sure of this latter benefit it is necessary to provide adequate progress control,* since otherwise, despite the efforts of the designer to facilitate production, it may lag through avoidable delays between processing operations.

Quality of Workmanship.†—Standardisation of dimensions has two aspects. The first, that of nominal dimension, may have some bearing on quality of workmanship, but it is the second aspect, that of tolerance (or permitted variation from the nominal dimension) which seriously bears on quality of workmanship, and affects both method and cost of production. The finer the tolerance, the greater the care necessary to obtain products of the required degree of accuracy. Interchangeability, which has so great a bearing on economical assembly and on the feasibility of a spare-part service (extremely important for some manufactures), may not of itself require working to fine tolerances. Bricks, by their method of manufacture, are interchangeable, but would not comply with any strict standard of measurement. On the other hand, shoes made from the same last are interchangeable, and are within a very fine margin identical in dimension over all grades of shoe. In the mass manufacture of room-doors, care in setting the wood-working machines will produce a correspondingly high degree of accuracy in dimension without increasing the production cost, but, in the case of a hand-made door, working to a fine degree of accuracy would increase the cost per door very appreciably. In metal working, modern automatic machinery, properly looked after in respect of the accuracy and condition of the cutting tools and the skill in setting them, can hardly help but produce high-grade work. With machinery that is hand operated the grade of workmanship will depend on the operator's skill; and high-grade work is likely to involve, accordingly, high machining costs. These various illustrations will serve to indicate the complexity of the relation of quality of workmanship to production policy. The right relationship between the two must be decided on the circumstances of each case, under expert advice as to alternative methods of production.

Quality of Material.‡—One of the virtues frequently claimed for British manufactures, particularly in engineering, has been

* See p. 112.

† See p. 104.

‡ See p. 105.

the high quality of material used. Sometimes this quality has been considerably above that required, with the result that certain parts of a machine would be "as good as new" when the machine as a whole would be scrapped.) This might be due to inadequate provision being made for replacing worn surfaces, to conventional ideas of what looked right, or to other reasons. Another form of so-called quality consisted of a solidity achieved by having excess of material "so as to be on the safe side." Engineering and metallurgical science has advanced so greatly in the last generation that quality of metal, at least, is now interpreted in a sense relative to the duty required of it. The right quality is not a question of expensiveness or substance but of appropriateness. The ideal would seem to be that successfully achieved in the "wonderful one-hoss shay" of Oliver Wendell Holmes that fell to pieces all at once, worn out in every part at one and the same moment!

Investigation and research may discover for a given purpose alternative materials of possibly widely varying cost. In some manufactures, such as foods and drugs, the degree of purity of the constituent materials may be the chief factor in settling production policy. The maintenance of a strictly uniform quality of material is, in any industry, likely to entail high purchase and inspection costs. In certain manufactures, the cost of working high-grade material may be less than that of working low-grade material. In other cases, it has been found that by using a higher grade material a smaller quantity than previously would serve the intended purpose, or would, by saving weight, give other advantages. Greater suitability of material for the ultimate purpose of the product is, in fact, a higher effective quality of material, and it may actually prove less costly.

The relation to production policy of quality of material, like that of quality of workmanship, is dependent on the circumstances of each enterprise, and it is not possible to formulate any definite relationship of general application. The issues involved serve only to emphasise the need for open-minded expert inquiry before production policy is decided on. Most valuable help in this direction is now being afforded to individual businesses by their own research departments in the case of a few large firms, or through co-operative research associations in the case of others (see Ch. III).

INITIATION OF PRODUCTION

It is to be assumed that the settlement of production policy conjointly with that of distribution (or sales) will rest with the Board of Directors (or the Partners). Under job production conditions, where work is put in hand against sales order only, and there is no manufacturing for stock, the Sales Department may possibly be responsible for issuing the initial instructions to the Works Department. With batch production, where production (although on a limited scale) is for stock in the first instance, even if sometimes the final stage of production may be specialised to meet specific sales or despatch orders, the possibility of considerable capital being tied up in the form of stock for which no ready sale can be secured makes the responsibility for authorising manufacture one that calls for approval either by the Board of Directors itself, or by a conference on which Finance, Production and Distribution are effectively represented—briefly, to coin a generic term, by the Higher Management. The principle at stake is too far-reaching for decision to rest with one department, whatever the scale of production.

With mass production, the authorisation of manufacture is a major responsibility of the Board of Directors that cannot properly be delegated. Although in principle mass production implies continuous production at some given rate per week, in practice it is advisable that the sanction by the Board of Directors should be in respect of a total quantity at a specified rate of production to a given design or specification. When this sanction is within a pre-determined period of being exhausted, a new sanction should be obtained from the Board. The period of production each sanction should cover must depend on many circumstances, but notably on the expenditure on material purchases that is thereby authorised, and the liability for changes in design that may become necessary. It is fundamental under batch and mass production conditions to ensure that changes in design, however slight, should not apply to work actually in progress. When design is so experimental that frequent changes are inevitable, then production should be on a job basis.

In all manufacture there is a risk of errors and defects, not capable of rectification, from such causes as wrong material, faulty material, faulty dimension, faulty finish, or errors,

defects or changes in design. Under job production, defective work must necessarily be replaced to complete the order, and it is usual to meet the emergency as and when it arises. Under batch production, with a larger output to provide for, it may be better to anticipate defective work by providing in the first instance for an appropriate excess of material, and probably also to prepare that material together with the net quantity required for the finished product. This plan is likely to save fresh machine-setting, which would be required to machine the replacements separately, and to secure delivery to stores by the proper date of the full complement of finished products called for by the production order. It follows from this that each production order must cover the replacement of defective work estimated to occur during its execution.

Under mass (or flow) production the same principle of providing for necessary replacements applies as under batch production, with the difference that the lack of balance brought about by defective parts is a question for periodic attention, so timed as to obviate the possibility of a seriously unbalanced condition arising. Under both batch and mass production, since production is nominally for stock—that is, not directly related to sales orders—there is, in theory at least, a measure of freedom as to the extent to which finished stock shall be in excess of current sales. This opens up the possibility of production, at certain seasons of the year, being considerably in excess of current demand, subject to the product not being one that would deteriorate or otherwise decline in value by being held in a warehouse. The advantages of such a course, where a trade is seasonal, would be, first, a greater and steadier output over the year from a given production equipment compared with concentrating production in the busy seasons, and, secondly, greater efficiency and goodwill assured on the part of the operatives by avoiding intermittent employment and changes in personnel or, alternatively, short-time and overtime working. The disadvantages are likely to be mainly financial, representing the cost of interest on the capital tied up in unsold stock (finished and in progress) which might offset the advantages enumerated, though the possibility of a smaller “fixed asset” investment being necessary might be an important compensation. The manufacture of artificial poppies throughout the year by disabled ex-service men in anticipation of their

disposal on Armistice Day in aid of Earl Haig's Fund is a simple illustration of an ideal arrangement from the above point of view, but in ordinary industry various degrees of compromise are inevitable.

Production having been authorised in proper form, it will be necessary to adopt some convenient method of bringing into operation the various functions necessary for setting the wheels of the factory going. It is apparent that decisions as to production policy and scale of production should precede decisions as to equipment and personnel generally, but, for the purpose of convenience in presenting the subject as a whole, some liberties must be taken with the chronological sequence that would obtain in an entirely new enterprise for which a new factory was to be built.

The functions or functional elements * that are concerned, or are likely to be concerned, in making the production programme effective are considered in the following order :

Design (Working Drawings) and Quality Control.

Operation Planning.

Progress Control.

Material Control and Purchasing.

Works Lay-out and Plant Management.

Questions of personnel, finance, and office organisation are dealt with in other chapters.

Working Drawings and Quality Control.—Working drawings should contain as much information and be as instructive and complete as is practicable. Although it may take longer to do this in the design department or drawing office, there are several definite advantages to be gained, provided the designer or draughtsman is competent to deal adequately with these requirements. They are, first, that time so spent will be saved many times in the actual manufacturing stages ; secondly, that instructions on a drawing are available for repeat orders ; and, thirdly, that if the organisation is sound, the various modifications shown to be necessary during manufacture will be incorporated on the working drawings.

Unless such a system of giving complete instructions is employed, it will be left to the foremen to make decisions

* See pp. 205-9.

which are not only outside their proper function but are made under unfavourable conditions. If they in turn delegate responsibility to the operative the problem of making correct decisions is aggravated. A further drawback is that for repeat orders the foreman may be forced to seek to employ the operatives used on the original order, thus often hampering the proper flow of work.

Instructions which are separate from either the drawing or manufacturing order are given on an assembly or part list. This should give the following information, classified under the several assembly units into which it is convenient to resolve the complete product :

Manufacturing Order No.

Assembly or Sub-Assembly unit identification and description.

Total number of assembly units required.

Component identification (Part No.) and description.

Number of components required for each assembly unit.

Number of spare parts, if any.

Total number of components required.

Allowance for defective work.

Material to be used, description and specification number.

For each component a unit drawing is issued giving every dimension, the tolerances allowed, heat treatment, if any, and finish (such as plating.) Also on the drawing there may be—though often a separate record is preferred—

Particulars of the quantity required ;

The precise material to be used ;

The quantity of material to make a given number of parts ;

The sequence of processing operations ;

The stages at which viewing or checking of workmanship is to take place ;

The special tools to be provided to facilitate manufacture.

By the unit-drawing system manufacturing operations and control are alike facilitated.

Identification of components is a matter of importance, and an essential feature of a working drawing is the code numbers or letters, or combination of both, which serve this end. Similarly, the groups of components which function

together (known as assembly units, since they form a convenient unit for assembly purposes) must be identified. The use of such units has two advantages, in that it not only makes the assembly processes more manageable, but also permits their standardisation and consequent application to different complete machines.

Quality in relation to manufacturing falls under four main heads :

Physical properties and/or constituents of materials used.

Dimensions of product.

Appearance or finish of product.

Performance and/or service of product.

In some cases one or other of these qualities may itself comprise one or more of the others ; correctness of dimension, for example, may ensure satisfactory performance, or right material may guarantee service of product.

Under each of these headings the appropriate standard of quality for product efficiency should be laid down. In practice the standards are more frequently traditional than specific or written, with the exception probably of dimensions of product. The standards which will be referred to hereafter will be always those appropriate to the product and, indeed, to the particular make or nominal quality of the product. But, whatever sort of quality is under consideration, it will be necessary to admit that some variation from the approved standard is inevitable, and it is the essential function of quality control to keep these variations within prescribed and acceptable limits. In dimensional standards the word "limit" has a technical significance, and refers to either of a pair of comparable dimensions, having the same nominal basis, of which the larger is termed the maximum or high limit and the smaller the minimum or low limit. The difference between maximum and minimum limits comprises the "allowance" and the "tolerance." The "allowance" is for quality of fit, such as running fit, push fit, force fit, etc. The "tolerance" is, according to the standard definition "a difference in dimensions prescribed in order to tolerate unavoidable imperfections of workmanship." The imperfections in question may be said to be unavoidable under the method of manufacture adopted as appropriate rather than unavoidable under any method

whatsoever, so that the definition might be improved by the substitution of "permitted" for "unavoidable."

In the same way that it is necessary to tolerate imperfections of workmanship as to dimensions, so there must be prescribed maximum and minimum "limits" of quality with regard to materials, appearance, performance and durability.

Quality control of material is dependent on the designer's specification. A specification of materials to be used is conveniently called a purchase specification, to differentiate it from the specification of the finished product. Buying by purchase specification, as large users of materials such as Government departments and railway companies do, involves a highly technical problem in the working out of specifications that both meet the requirements of the purchaser and are acceptable in form to the supplier. The British Standards Institution has made some headway towards standardisation of purchase specifications that have been arrived at by joint conferences between users and suppliers.

By standardisation of purchase specifications manufacturing economies can be stimulated and price competition tested. The necessity of inspecting material to see that it complies with the specification often, however, involves a great deal of trouble, and there is considerable scope for simplifying inspection by relying on the written undertaking of the supplier to comply with the specifications. In contrast to the laying down of purchase specifications, and possibly subsequent inspection of purchases, is found reliance on the standing of the supplier, as the guarantor that the quality is according to his own description.

Quality control of workmanship is achieved by inspection. The proper purpose of inspection is to ensure that the requirements of subsequent operations are served, and, particularly, that the finished product shall be strictly in accordance with the designer's intention.

In constructional industries, such as engineering and, to a less extent, in continuous process industries, such as chemical manufactures, the time required for any processing operation must depend on the amount and/or quality of work to be done, and this in turn is dependent on the conditions prevailing. Quality control is necessary to provide a reliable and fixed basis for the computation of time required for each operation. Scientific production measurement cannot exist without

scientific quality control. Further, only by dimensional quality control is it possible to advance towards assembly efficiency. The extent of the possibilities in this connection is probably seldom realised; for assembly efficiency is simply another name for interchangeability, so that, in serving the interests of economy in manufacture, one aspect of product efficiency may also be served by making spare parts interchangeable with worn parts, subject to certain qualifications.

Inspection is but one factor in the extensive manufacturing organisation which is demanded by dimensional quality control. An inspection department should be regarded as an independent precaution against defective work passing into service. The main responsibility for producing work of the right quality should rest with the foreman. He in turn must, for his equipment in the way of plant and tools, look to those specially appointed to this task; but it is also his responsibility to see that the equipment provided facilitates, to the utmost degree, the production of satisfactory work, and to report to his manager when that is no longer the position. Criticism of this character is not always welcomed, although the Management should be broad-minded enough to receive in good part any comment directed to furthering the good of the business, and, when a remedy for reported deficiencies is not considered possible or expedient, to accept responsibility accordingly.

Operation Planning.*—Operation planning involves the simultaneous survey of all the operations necessary to complete a given product. Judgment as to the best general scheme to adopt is likely to be hampered by premature attention to detail; but, on the other hand, there is, unfortunately, a too common tendency to stop short at the general scheme, and to leave the details to work themselves out haphazard while the work goes through the shops. The general scheme of operations should be tentative until the method for each operation has shaped itself. In the manufacture of components, for instance, the decision to adopt a special tooling device for one operation might easily react on other operations.

Motion Study is concerned with the intensive study of the movements incidental to performing a particular operation. In some cases photographs are taken of the actual movements of an expert operative to be used as a basis of study. When an

* See p. 208.

operation is indefinitely repeated a microscopic saving in the movements involved may, by saving time or lessening fatigue, mean a considerable increase of output in the course of a year.

Motion study requires in the investigator a mind scientifically trained or, at least, prepared to adopt a scientific approach to the problems encountered, which frequently have, in addition to their technical aspect, psychological and physiological elements. The sequence of movements adopted must correspond to the mentality of the average operative employed on any operation, not to that of the investigator. There are two conditions, however, which tend to restrict the application of motion study. First, it will effect noticeable savings only when movements by the operative form a substantial part of the complete operation. On some operations, even if the time spent in movements by the operative could be studied out of existence, the saving would be comparatively small. Secondly, a considerable run of work is necessary before the new habits called for can be acquired.

Special Tools.—In component operations, efficiency hinges very largely on the technical judgment shown both in the decision to provide special tools and in their design. Inefficiency in special tool design involves a loss in service that is multiplied by the number of times the special tool is employed. Judgment is also called for to decide whether the cost of a special tool will be justified by any economies that may result from its use.

Special tools may be devised to save machine setting or material setting or even tool setting, to save material preparation, to obtain uniformity in dimension and to permit the use of less skilled operatives. The commonest objective is to save time in processing. Uniformity of dimension may be of much importance in assembly.

Time Study.—Before time study had achieved the significance it came to have later in the Taylor system of scientific management, there were in British engineering works those who were called “feed and speed” men, whose duties were to see that machines were being worked at the right cutting speed and feed, which largely controlled the time required for an operation. It may be explained that cutting speed is the surface speed at which the material to be cut meets the cutting tool, or, alternatively, if the cutting tool revolves, the surface speed of its cutting edge where it meets the material. Feed,

on the other hand, is the rate of advance of the cutting tool to operate on new surface, or of the work towards the cutting tool to enable new surface to be worked upon. With the extended application of the premium system of payment-by-results the "feed and speed" men developed into rate-fixers, and in effect began to stipulate the time allowed for a given operation rather than the feeds and speeds to be used; although if a time-allowance was disputed the rate-fixer had to substantiate his estimate by disclosing the feeds and speeds on which it was based.

Time study is usually associated with payment-by-results, and more particularly where there is a guarantee that the worker will be paid not less than the time or day-work rate for the time worked. This arrangement is a feature of the premium, or premium-bonus, systems adopted largely in the Engineering trades under the "Carlisle" agreement of 1902 between the Employers' Federation and Trade Unions concerned. The factors entering into job rates under payment-by-results are discussed on p. 158 of Vol. I. The whole technique of rate fixing is dealt with in *Payment by Results*,⁵⁷ by J. E. Powell.

It may be further noted here that time study should be applied to the different elements or steps in each operation or process for which it is intended to fix a job rate. Allowances must be added in respect of fatigue and minor contingencies. The total estimate thus reached represents an efficiency which it is considered would not be maintained or could not be expected, on the average, without the stimulus of extra pay. Job rates are therefore offered to provide an incentive to some degree of voluntary extra effort, and are accordingly based on an equitable estimate of time and output that will enable a reasonably industrious and competent worker to earn extra pay amounting to, say, one-third of the time-wages value of the time occupied.

Under piece-work systems, where the actual time taken for a given output is less than the time estimated as above-mentioned, wages increase in direct proportion to the increase in output. There are premium bonus systems under which increases of wages in respect of increases of output during a given period are arrived at in accordance with formula computations on which agreement has been reached. Job rates, therefore, under different systems of computation are not strictly

comparable, and the apparent saving on any job may need adjustment to ascertain the real saving. It must be remembered that, under any arrangement for extra payment in consideration of increased output, the operative is guaranteed minimum earnings to the amount which would be due to him if he had been working under his normal time rate.

Machine Setting.—Where machine setting is necessary, operation planning will be affected according as the machine setting is to be carried out by the operative, or by a specialist machine-setter whose highly-paid mechanical skill would be wasted on the operation itself. Frequent changes in machine-setting affect operation costs, while an elaborate setting that would be economical for a run of a thousand might be the reverse for a run of a hundred.

The economic test of the run of work (or size of batch) that can be operated on to best advantage at one setting of a machine involves three factors :

(1) The inclusive machining time per unit of output—in other words, the operating time plus the appropriate share of the machine setting time, according to the quantity operated on at the same machine setting.

(2) The period for which any given quantity will meet stock requirements, called here the “stock period.”

(3) The length of time that the machine may conveniently be kept on the same job, or without necessitating re-setting.

The first factor could be equally well measured in terms of wages cost, but if job rates are built up on the lines

Size of Batch.	Machine Setting (Preparation Allowance).	Operating Allowance.	Time Machine Occupied.		Unit Machining Time.	Stock Period.
No.	Mins.	Mins.	Hrs.	Mins.	Mins.	
50	60	50	1	50	2·20	1 week
100	60	100	2	40	1·60	2 weeks
200	60	200	4	20	1·30	1 month
400	60	400	7	40	1·15	2 months
600	60	600	11	00	1·10	3
800	60	800	14	20	1·08	4 "
1000	60	1000	17	40	1·06	5 "
1200	60	1200	21	00	1·05	6 "

advocated,* a time measurement is more convenient. Where machine setting is done by a highly skilled worker, and the operation is performed by a semi-skilled worker, the difference in wages rates, for the two stages, may make it necessary to use money rather than time values.

For the purpose of illustration, the fictitious data on page 109 have been assumed (the operating allowance per unit of output being taken as 1 minute).

Unit Machining Time for Different Sized Batches
(Inclusive of Machine Setting & Operation)

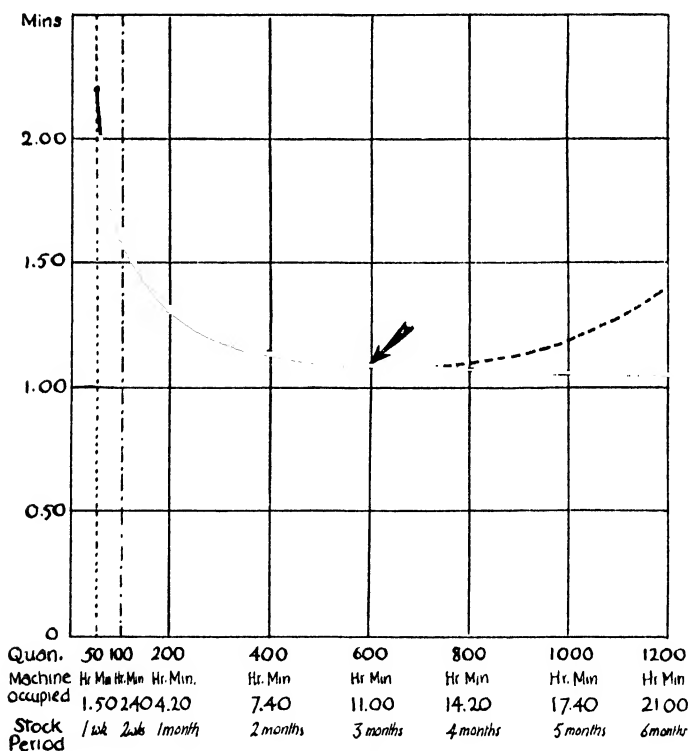


FIG. 4.

The unit machining times for the different size batches are plotted as a chart in Fig. 4.

Any graph prepared on the foregoing lines as to unit machining times, or, alternatively, unit wages costs, will be

* See Vol. I, p. 158.

found to make evident, by the flattening of the graph, the size of batch when further machining economies will be too small to be likely to outweigh the disadvantages of excessive stock and prolonged occupation of the machine—the latter being often a vital point in connection with progress control. The arrow point in Fig. 4 indicates a possible optimum size of batch, but any decision would depend on the specific circumstances of the moment. The trouble of preparing graphs would not always be worth while, but in important cases their use would resolve any doubts of what should be done.

The disadvantages of excessive stock arise from the costs of needlessly idle capital, of storage and risk of deterioration, and of the risk of obsolescence. These may be described briefly as “financial costs.”

The dotted graph that has been added is not intended to be to scale, but is included to indicate the trend of the resultant cost per unit, when regard has been paid to the financial costs above mentioned. To plot such a graph, with any pretence to accuracy, would necessitate a careful exploration of the financial costs in question, and this is hardly likely, in practice, to be considered necessary. If it were necessary, either the unit machining time could be converted into money value, or the financial cost factor could be expressed as equivalent in value to so much machining time.

Operation Schedules.—The foregoing considerations should find ultimate expression in operation schedules for each component or product. (These schedules constitute a route map of operations on the respective components.) Progress control is to a large extent the drawing-up of a time-table for the journey thus planned. The scheduling of operations needs to be thorough, and allowance must be made for intermediate viewing—that is, examination of work between operations—for process work such as annealing and hardening and, not least important, for inter-departmental transportation between operations when necessary. For small parts in large quantities, even counting may have to be recognised as an operation. In fact, every step of the journey must be provided for.

~ An operation schedule should show, in respect of each operation :

The department in which it is to be performed;
The type of machine to be used;
The tools to be used (particularly special tools);
The job rate (preparation allowances per batch, and operating allowance per piece).

Progress Control.—The purpose of progress control is to secure delivery of product in accordance with a schedule. In job or batch production this aspect is of paramount importance in ensuring that the correct goods have precedence. The effect of properly organised progress control is to obtain the quickest possible turnover of work-in-progress. Efficient delivery is attainable only by organising what may be called efficient “work turnover.” Indeed it is only from efficiency of work turnover that it becomes possible to discover what constitutes efficient delivery. In these days of intense competition the importance of efficiency of delivery can hardly be emphasised too strongly.

The direct monetary advantages resulting from work-turnover efficiency are to be found in the avoidance of personnel waiting for work, and in the saving of interest charges, or avoidance of financial stringency, which would otherwise result through capital lying needlessly idle in the form of work-in-progress or unemployed machinery.

Another and vital aspect of work turnover efficiency is concerned with balancing of production. The passing through of each component in the minimum time is not, by itself, enough—the output of different components must be balanced so that the complete saleable unit can be assembled without delay. To ensure this it is necessary to recognise the variations in time required to make each component and to plan accordingly. Failure to do so will result in unbalanced assembly and financial waste, due to material being bought before it is wanted, and wages paid out needlessly early, and, possibly, on the other hand, machinery occupied by work that could wait, to the delay of other work more urgently required. Progress control resolves itself largely into settling for each machine the sequence of work to be performed on it, instead of leaving this to be arranged by the foreman on inadequate information.

Before progress control can be proceeded with in any detail,

there are several " office " stages to be completed, resulting in the issue of the following :

Departmental copies of the production order ;
Appropriate instructions to design department ;
Working drawings, and manufacturing instructions ;
Operation schedules.

The office departments must be given dates, not a period of days. If the first department fails to complete by the date given to it, the date given to the subsequent department must not be extended.

Purchasing procedure, in its relation to progress planning, means ordering in the priority requisite to the realisation of completion date for assembled product. The secret of getting satisfactory output is to have correct " input " dates of materials into the works, and for work once started to be kept moving until finished.

To avoid wasteful capital charges for stock investment it may be wise, when settling delivery dates with which the supplier of material is to comply, to have regard to the number of batches into which the total requirements of each production order is to be divided. Considerations of carriage and convenience may, on the other hand, justify complete delivery in the first instance.

Many components, notably nuts, washers and screws, are standardised, and it will then nearly always be cheaper to buy them than to make them. The range of standardised components tends to increase, thus often making possible reductions in costs, but components may also be bought to economise time rather than money when their production in the factory might delay the assembling programme.

From experience in buying, standards relating to the time required for obtaining various materials can be arrived at and tabulated for general guidance. Constant co-operation between the buyer and the progress controller will be necessary because technical questions will arise, *e.g.* the use of die-stampings instead of solid material which requires elaborate machining. Sometimes such questions may seem to be concerned more with design, but progress control needs to be conducted with some initiative as to possible alternative methods, and must be pursued generally in such a spirit that

emergencies will always evoke remedies. Such emergencies may arise from breakdown of plant, sudden spoilage or hold-up of large quantities of components, or other causes, and the remedy may sometimes take the form of buying certain components outside. To pursue this course, however, a margin of time would be required which would be rarely available unless trouble of this sort had been anticipated and provided for.

The time required for making a component is arrived at from the operation schedule, which provides information as to the operations involved and the time required for each. This information has to be developed in several ways :

- ✓ As to the setting and operations time required for different batch quantities ;
- As to intermediate viewing or inspection requirements ;
- As to conditions for transportation between operations and viewing, and *vice versa* ;
- As to liability to delay due to machines being engaged on other work.

No amount of skill in planning and progress control will remove, though it should reduce to a minimum, the handicap of insufficient capacity of equipment. One of the most valuable functions, therefore, of progress control is to find out in advance in what direction plant is inadequate. The deficiency may only become apparent when output demand is at an unusual level, but the decision to instal additional plant should properly have been taken a long time beforehand. If the forecasting of sales is practised, however, production demands can be assumed in advance and, with intelligent production planning, the requisite balance of plant can be anticipated.

In component manufacture the size of batch adopted is of great importance. Recognition must be given to the time that is absorbed *between* processing operations as well as the time absorbed *in* processing operations. It is quite an ordinary condition for the intervals between operations to be from 50 to 100 per cent. of the operation times. In determining the economical size of batch, there are two constants which apply to any quantity operated on in unbroken sequence :

- Total machine-setting time at each processing operation ;
- Total time or interval *between* all processing operations.

The loss of machine output due to the 'first item, and the delay in completion arising out of the second, remain very much the same whatever the size of batch. The time occupied in processing operations will, however, vary directly with the size of batch. The right compromise between the smallest possible batch that would give the earliest completion of a minimum number of pieces, and the largest possible batch to give the lowest cost per piece completed, is not so much a matter of formula as of discretion on the part of the progress controller. He should, however, exercise this discretion in a scientific way by plotting the results for different-sized batches of particular components, and making his decision each time in the light of the immediate production programme.

When batches follow one another (as in mass or flow production) without others of different kinds intervening, or when machines are kept permanently set up for particular operations, the first constant becomes unimportant.

After the question of batching has been provisionally settled, the proposed production programme must be fitted to the machine capacity by a process of allocation. The times for which the various types of machines will be required can be aggregated from the operation schedules. It would in most cases be unwise to allocate work to the limit of the machine capacity, since any serious breakdown would dislocate both the current and subsequent output programme. A contingency allowance must therefore be made ; but the margin of machine capacity that is not allocated for this reason will not be thereby lost, as, if no breakdowns occur, the extra capacity will allow the production programme to proceed a little faster than planned.

Material Control and Purchasing.—This is best considered under six main headings :

- 1 Selection or specification ;
- 2 Consumption control ;
- 3 Stock Control ;
- 4 Storekeeping ;
- 5 Purchasing ;
- 6 Transport.

Selection or Specification.—Although in practice much material is bought on the basis of what is available, there is considerable scope here for research which can be applied with

advantage to the selection of material. In production materials, *i.e.* materials entering into the product, standardisation in specifications and in dimensions has to a certain extent become effective. Progress in this connection will be probably in the direction of simplification, *i.e.* of reducing the range of standards in use. On the other hand, with "service" materials—those used in connection with production but not actually forming part of the final product, such as departmental (sometimes called consumable) supplies and materials for maintenance purposes—little is at present being done to establish standardisation and build up specifications.

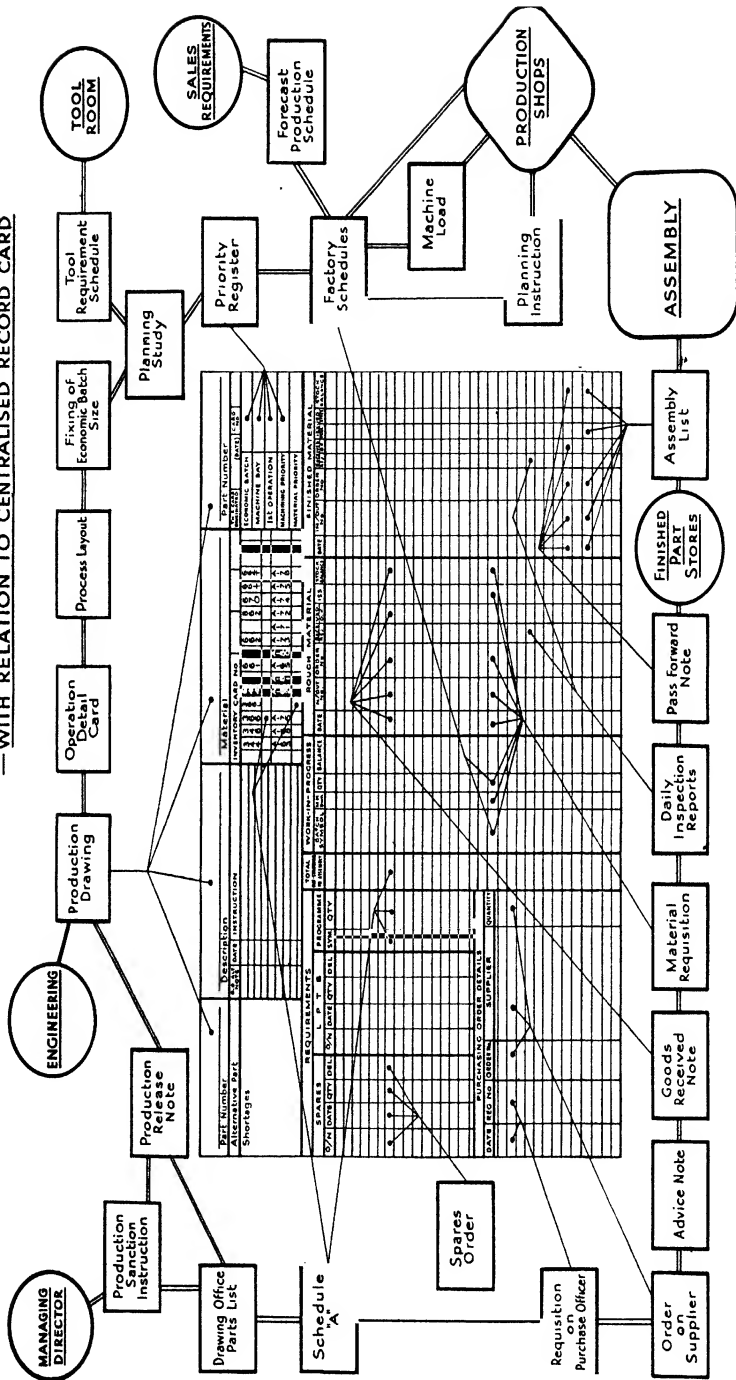
Consumption Control.—After "production" and "service" material has been rightly selected for its purpose, to achieve maximum economy it is necessary to exercise some control over its consumption.

Where stock material is used, it is desirable that the drawing office or the design department should specify on each component unit drawing the exact quantity of material necessary to make a standard number of parts, such as ten or one hundred. This computation, made with due regard to manufacturing requirements, provides not only the basis for estimating costs, but also for the control of consumption, by defining the quantity of material to be issued for the production of a prescribed number of components. Instead of shop foremen preparing material vouchers for drawing from stores the material necessary for each batch of parts, it becomes possible for an office department (usually the works office) to prepare such vouchers in advance, and so to control the release of material into production according to a time-table, planned to provide a balanced supply of components to meet the assembly programme.

Consumption of "service" material is a more difficult problem. Where a drawing is prepared of, say, a plant alteration, it is possible to prepare in advance a quantity list of material. If this is not done the foreman must work out the quantities when the job is started. The first method is not likely to be feasible except where careful estimates are required before "service" expenditure can be sanctioned. A sound solution is a compromise whereby job orders are issued for each item of "service" expenditure, the costs being kept under each order and debited to the department benefiting by the expenditure. The "service" foreman has to see that

ROUTING OF PRODUCTION CONTROL DOCUMENTS.

— WITH RELATION TO CENTRALISED RECORD CARD



the cost is appropriate to the service rendered, and the department "buying" the service becomes an interested critic of the charge made. The practice tends to check demands for expenditure, but it should not be allowed to lead to neglect of essential repairs or facilities.

Stock Control—Concerning this, D. H. Bramley³⁹ says :

No production planning procedure can operate unless it is possible for the correct production position of each part to be ascertained quickly and accurately. By "production position" is meant :

- (a) Total requirements ;
- (b) Models on which part is used ;
- (c) Total quantity of raw material outstanding from suppliers ;
- (d) Quantity of material in rough stock ;
- (e) Production orders in hand in the factory and number of pieces of material on each order ;
- (f) Number of completed parts in finished part stores ;
- (g) Number of parts to be issued to assembly—or delivered direct to customer—to complete outstanding commitments or orders.

To satisfy this need it is obviously necessary that a centralised system of stock control be set up. If the method of organising such a system is satisfactory, it should be possible to eliminate all other production stock records within the organisation.

An example of this kind of centralised control record is shown in Fig. 5.

The work of such a stock control department can be divided into simple clerical work which can be undertaken by female staff, and responsible clerical work which can be delegated only to senior clerical workers. The more important responsibilities of the latter can be as follows :

- (a) Initiating new stock control records for parts not previously produced ;
- (b) Issuing "production release" notices to process and rate setting department, jig and tool department, and progress planning department for each new part ;
- (c) Requisitioning materials which must be purchased to cover the requirements of each part in production ;

(d) Authorising making of patterns for castings, dies for drop forgings, tools for pressings, etc., when purchased from external sources ;

(e) Issuing works orders authorising batches of rough material to be released to the factory for production ;

(f) Adjusting stock control action in accordance with drawing office alteration notices ;

(g) Allocating finished material to orders on hand according to relative urgency of demand.

The simpler clerical operations will be concerned with recording receipts and issues of materials under each section of the stock control record—information being carried to the clerks by material movement documents—the more important being :

(a) Copy of purchase order for materials ;

(b) Goods received note ;

(c) Goods rejected note ;

(d) Works order and material requisition ;

(e) Inspection reports for manufacturing scrap ;

(f) Final inspection certificates ;

(g) Finished part stores issue lists.

In view of the fact that such records are valueless unless they are up-to-date and completely accurate, close supervision is necessary. Strict rules must be laid down that the records must not be more than 4 hours behind actual stock movements—and the routing of material movement documents speeded up accordingly. It is also important to have periodic stock inventories to prove the accuracy of the records. Fortunately, this last point is covered indirectly under the Companies Acts, since the whole of the work in progress materials should be physically checked and their value certified for the purpose of preparing the company's balance sheet for audit. This periodic check is known as stocktaking. It is usually carried out at a specified time each year, when production is suspended while the physical count is made. Another method, which overcomes the difficulty of suspending production, is called "perpetual inventory", under which auditors will accept stock record figures providing a competent and reliable person is kept

continuously employed checking physical stocks against the figures shown on the records and maintaining a register of all counts made and discrepancies found.

There are two principal methods of controlling stocks :

(1) By requisition against definite contract commitments—plus allowance for wastage—for each part or type of material ;

(2) By fixing maximum and minimum stock figures for each type of material and, when the stock falls to the “ minimum stock ” figure, by ordering a sufficient quantity to bring it back to the “ maximum stock ” position.

Where :

Mi. = Minimum stock ;

Mx. = Maximum stock ;

R. = Consumption rate ;

T. = Time to get fresh supplies ;

S. = Safety margin ;

P. = Proposed period between re-ordering ;

the “ minimum stock ” figure can be fixed as follows :

$$Mi. = R. \times T. + S. ;$$

and the “ maximum stock ” would then be :

$$\begin{aligned} Mx. &= R. \times T. + R. \times P. \\ &= R. (T. + P.). \end{aligned}$$

Introduction to Foremanship.

*Principles of Production Organisation and Planning.*³⁸

Storekeeping.—By stores is meant the place in which material is stored. The term “ stock ” applies to any and all material held by the storekeeper. “ Special ” purchases or purchases for a special purpose, for instance, become “ special ” stock while in the storekeeper’s charge. Stores may be sectionalised in many ways. The more frequent plan is to have a general stores for “ service ” material and “ rough ” (or raw) production material. There are often subsidiary stores for oil, timber, bar metal, etc. Production material that has been processed is held usually in a finished component stores. Assembled product, ready for sale, is normally stored in what is usually called the warehouse. Partly-processed material can with advantage be held in a work depot, sometimes called a work-in-progress stores.

∴ Storekeeping operations may be dissected as follows :

Requisitioning supplies (stock maintenance);

Receiving, inspecting and storing supplies; return of faulty goods and packages;

Issuing material;

Keeping records of stock.

The test that should be applied to all stock is the rate of turnover. Not only is a considerable financial gain to be obtained by reducing investment in stock to a minimum, but an accumulation of stock which is likely to become obsolete, with its attendant wastage of money and of stores labour and storage space, is avoided. At the same time care should be taken to prevent any shortage that would hold up production.

The simplest way to measure stock turnover is by the number of weeks' stock in hand at a given moment. Stock records should include for each item a note of the average weekly consumption and the number of weeks the stock will last on that basis. The attention of the Management should be called to stocks above and below the authorised levels. To provide for occasional wide fluctuations of demand from week to week which would upset this plan, special purchases may be made to meet exceptional demands.

Purchasing.—The importance of buying to a manufacturing business is very great. If proper skill and judgment are not exercised in buying material, it may negate all the efforts and strivings for efficiency in production and distribution upon which the financial success of the business so much depends.

∴ Purchasing policy can be considered under at least four heads:

Purchasing in bulk at "bargain" prices;

Purchasing ahead by period contracts;

Purchasing according to the fluctuations of current market prices;

Purchasing "from hand to mouth."

"Bargain" purchasing, as the first policy may be called, offers great prizes and involves correspondingly great risks. Buying material in this way means taking delivery and paying at once. It is in large measure speculative except it may be assumed that, unless the trade is one subject to changes of fashion or there is a slump in demand, all material bought will be used within a reasonable time.

“Contract” purchasing means buying for future delivery at an acceptable price, and obviates the necessity of carrying unduly large stocks; but there is the same risk as with “bargain” purchasing of prices subsequently falling, so that a higher price is paid than if purchasing had been delayed.

“Market Price” buying is perhaps the most usual method in respect of staple commodities, purchases being confined to short-term requirements, but otherwise in such quantity as current prices and trends seen to warrant. The buyer retains a limited discretion as to whether he places his order immediately or delays it. He will be able to act more circumspectly if the production programme has been properly worked out in detail as to dates on which materials are required.

“Hand to mouth” purchasing is the safest and, except for staple commodities, possibly on the whole the cheapest policy to follow unless the market is rising and is likely to continue strong. With goods made specially to order the cost of a small quantity may, of course, be quite disproportionate, although, on the other hand, to buy more than can be used in a reasonable time is not truly economical. In view of the practice of monthly settlements, the minimum quantity likely to be purchased at a time is a month’s supply; it is good policy to obtain supplies at the beginning of the month rather than at the end.

It must be remembered that each purchase is in law a contract. In addition to specification and price there are other quite general conditions which are of some significance in connection with purchasing efficiency. These are usually printed on the purchase order form, and should be reasonable in character and drafted in terms as precise as possible, so as to obviate reliance on unwritten, and hence debatable trade custom, should a dispute arise. The following conditions are quoted from the order form of a noted London house buying for clients abroad.

✓ *Inspection*.—Goods supplied to be subject to our inspection and approval before despatch, such inspection, however, not relieving you of responsibility. Advice to be sent to our London office immediately goods are ready.

Guarantee.—You undertake to replace, free of charge, any part or parts which, owing to defects in design, material or workmanship, may fail during one year from delivery of goods at final destination.

Patents.—In accepting this order you are understood to accept all responsibility for any infringement of patent rights.

Delivery.—The time specified, unless otherwise agreed, will be deemed to be of the essence of the contract.

Packing.—Goods supplied to be properly packed for ocean transport and railway transit to final destination.

Terms.—Price is understood to include packing and delivery f.o.b. as specified, inclusive of all wharfage, river, dock and harbour charges. Payments will be made at our London office after receipt of bills of lading from shipping agents.

Disputes.—If any dispute arises under the contract it shall be settled either by arbitration or according to English law.

*Transport.**—Internal transport within any works may be, and often is, too little suited to the real necessities of the case. Investigation of this function is but an extended form of motion-study which should precede the lay-out of departments and sequences of processes. The course followed by work during its manufacture, when plotted to scale, is frequently found to be very tortuous and surprisingly long. As a general rule, it is the number of handlings work receives rather than the length of the journey it makes that matters. For instance, if work has to travel at one stage in a lift it makes little difference whether it is moved to the next or a further floor. Sometimes the greatest waste is occasioned by operatives journeying to and from the stores to obtain materials, drawings, or tools, when what is needed may be a service to the operative, or a compromise whereby sub-stores are established within a department. Other transport questions arise in conveying work to an inspection centre. In principle this should adjoin a work depot where work can be deposited, after inspection, in readiness for issue to the next operation or, perhaps, a store where components can be deposited in readiness for assembly.

For purposes of internal transport many methods are available, of which mention may be made of the following: Trucks (hand or power operated), Containers, Runways (on the floor or overhead), Pipe-lines, Chutes, Conveyers (belt, roller, and worm), Cranes and mechanical handling generally.

* See pp. 126 and 136.

Hand trucks make good containers for assembly sets. Some of the methods, to be justifiable, call for a virtually permanent lay-out of the plant which the transport arrangements are to serve.

External transport is not usually organised by individual firms in connection with incoming goods, as the suppliers of material commonly consign goods through to the buyers' stores, and delivery is effected accordingly by the public transport service that is probably used. The despatch of goods from the works may involve an extensive road transport organisation at the works for delivering goods to customers, if for no other reason than to eliminate as far as possible risk of damage and delay in transit. For most works, despatch is mainly a matter of packing goods suitably for their method of transport and destination, and handing them over to a public transport service such as the railways, which probably handle the greater bulk of manufactured goods. If the volume of traffic in and out justifies it, there may be a railway siding into the works with platforms and lifting tackle to facilitate loading and discharge, etc. This arrangement entails attention being paid to problems of traffic organisation to prevent demurrage, or charges made for holding up trucks. Many trucks are privately owned, and this creates a big problem of its own in the handling of railway goods traffic.

WORKS LAY-OUT AND PLANT MANAGEMENT

In theory the selection of a factory and plant should be the last phase of organising for production, but in practice exceptional previous experience would be required before all the details of an effective organisation could be planned in advance. They would be developed largely in the course of actual manufacturing. For the student who is considering the subject in the abstract without any particular works or industry in mind, only certain general principles can be laid down, but these will help to focus his thinking in the case of any particular project when the need arises. Although many of the questions connected with the design and construction of a works or factory are concerned with technical issues, and are hence somewhat outside the purely administrative sphere, the initial stages of such a project are primarily administrative. In

practice it will be found that the most important feature of a factory, as a building, is not so much the materials of which it is built as the disposition of space therein, and it is the administrator's job to indicate clearly to the technical experts his requirements in this respect. This aspect of works design and construction is conveniently termed "works lay-out."

Works Lay-out.—This is likely, according to J. Fearn,⁴² to involve the following considerations :

- (1) Choice of site, having regard to—
 - (a) Availability of personnel and staple materials.
 - (b) Availability of trade services.
 - (c) Transport facilities by road, rail and water.
 - (d) Disposal of waste and by-products.
 - (e) Cheapness of water, fuel, lighting and power.
 - (f) Local building bye-laws and restrictions.
 - (g) Fire protection, sanitary and hospital facilities.
 - (h) Room for extension and auxiliary purposes such as recreation and education.
 - (i) Cost of land and conditions of tenure.
 - (j) Local rates and charges.
 - (k) Subsoil factors affecting building costs.
- (2) Types of buildings.
- (3) Proportions of buildings, *e.g.* column spacing.
- (4) Economical arrangement of space for various sections, such as producing or processing units, personnel, material in progress, internal transport, supervision, inspection, ambulance and rest-room, etc., arranged to facilitate flow of work.
- (5) Provision of light, natural and artificial, ventilation and heating.
- (6) Provision of power, normal and emergency.
- (7) Means of internal transport, *e.g.* cranes, runways, trolleys, conveyers, chutes, lifts.
- (8) Arrangements for supervision and training.
- (9) Arrangements for inspection.
- (10) Arrangements for certifying work done under a payment-by-results system.
- (11) Arrangements for regulating work in progress.
- (12) Provision for tool supply and control.

(13) Provision for plant maintenance.

(14) Arrangements for flexibility of production either as to kind or quantity of product.

Type of Building.—The prime necessity in a building is to ensure efficiency of operation of the plant and personnel it houses. For the latter it is of the first importance that the problems of dust-removal, ventilation, heating and lighting should be adequately met in order to preserve the health and energy of the operatives; while if it is possible to eliminate distractions of noise, and provide a setting that is not soul-killing in its dullness, the quality of work done may alone well repay the trouble taken.

Arrangement of Plant.—In the design of most works the dimensions and arrangement of plant are likely to determine the main characteristics of the building in which it is to be housed. In continuous process industries especially, such as food, chemicals, metallurgical products, etc., special purpose buildings are necessary, *e.g.* breweries and foundries; while auxiliary services will always demand special purpose buildings, such as the power-house, even when the production plant does not. Since the product in continuous process industries necessarily passes through a fixed series of machines or apparatus, there can hardly be an alternative to a sequential arrangement of the plant, though the precise location of each producing unit in the chain may be subject to considerations of transport of the work from one process to the next. This may be complicated by the necessity for returning to an earlier process, after reaching a later stage.

With regard to constructional industries, such as engineering, furniture manufacture, etc., there exist works lay-out principles which have a general application, not without significance also in other industries necessitating special-purpose buildings. The producing units in constructional industries may be grouped in either of two ways or in some combination of both.

(a) Producing units of a like character may be segregated, *e.g.* in an engineering works all milling machines may be placed in one department under a milling specialist.

(b) Producing units may be arranged in sequence of operations, *e.g.* in a sewing-machine factory the machines necessary to make each component may be grouped together so that the

component is produced from start to finish with a minimum of transport.

Producing units may be arranged in varying combinations of (a) and (b), *e.g.* in a joinery works the timber may be cut to size, planed and sawn to length in adjoining machines and then passed to particular sections such as turning, tenoning, etc.

Where heavy pieces, such as large steel castings, are concerned, the cost of transport will probably make it desirable to group in sequence the machines involved so as to minimise the amount of transport required; but, unfortunately, every piece will not involve the same machines or the same sequence of operations, so that the final result is likely to be a compromise in which transport economy is probably largely sacrificed. In this respect the guiding principle should be that producing units requiring to be used in sequence should be, not necessarily near each other, but conveniently placed with regard to one another.

To attain flexibility of plant lay-out to meet variations in kind or quantity of product a system of interchangeable countershafting may be adopted, although the principle of self-contained individual motor drives is making very rapid strides, even on the smallest machines, such as sewing-machines. Either principle permits machinery to be rearranged very readily and at little expense, while it becomes practicable to transfer a series of machines for manufacturing a given component to the tool-room for setting up the machines and trying out the tools. The machines, when put back into regular production, need a minimum skill in operation, as the chances of error are practically eliminated, more particularly on strictly repetitive work.

Whatever the principle of production plant arrangement adopted, too much attention can hardly be given to maintaining a balance of plant so that all work, when put in hand, can be kept on the move through its respective operations until finished. In addition to adequacy of each type of producing unit to meet these demands, there must be a margin sufficient to meet contingencies occasioned by machine breakdowns, and occasional absence or inexperience of the operator.

The next question is the lay-out of producing units to facilitate the convenience of operators, access for repair, and transport of work and supervision in the most economical way.

To keep the shop floor clear of work-in-progress other than the job in hand at each producing unit, central space may be allocated as a work depot. Gangway space fulfils one of two functions, viz. operating space or traffic space. Operating gangways should have sufficient room for the operators and their work, and no more. Traffic gangways should be designed to take either one floor trolley or, at most, to permit two to pass. Any width in excess of requirements is wasteful, and the waste is multiplied by the length of the gangway.

Power Supply.—The main purpose of power supply is to drive machinery. This may be done by using electricity to drive motors for each machine or group of machines, or by mechanical transmission through shafting from a prime-mover, either a steam turbine or reciprocating engine, or a gas or oil engine. Electrical driving has the advantages of cleanliness and flexibility and ease of starting and stopping, while it is particularly attractive in cases where it is desired to operate individual machines independently or intermittently. With the extension of the central power-station "grid" scheme, supplies of electricity may prove an important encouragement to the freer use of power in industry and lead to a cheapening of production, although, in large industrial centres, the grid scheme, as such, can perhaps have little useful effect.

The trend towards the greater use of electricity in industry is to be noted from the 1930 Census of Production Reports : ²²

	Power applied mechanically.	Power applied electrically.	Total H.P.
	H.P.	H.P.	
1924	6,609,900	6,546,200	13,156,100
1930	5,853,000	8,961,100	14,814,100
	11·5% decrease.	36·9% increase.	

Plant Management.—Plant management, as a function, commences with the specification of the plant to be purchased. This is, of course, a highly technical matter, but, like so many technical questions, has a very important administrative significance. Biassed or incompetent technical advice may result in future manufacturing operations being saddled with inefficient plant or excessive standing charges for depreciation and interest. No amount of trouble or reasonable expense

should deter the administrator from verifying that his selection will give him the maximum return during the life of the plant. Further, manufacturers of plant are like all other manufacturers; their products may vary from time to time in quality and efficiency. At the same time it should not be assumed that a right choice at the time of purchase will continue right indefinitely. The best to-day may not be so to-morrow.

A change of manufacturing policy or a new invention may make the discarding of existing plant and the purchase of new vastly more profitable than any other investment; but the courage to do so comes only from keen observation and a persistent attitude of inquiry and research, with its implications of open-mindedness and willingness to learn.

Plant management means, among other things, testing from time to time the comparative profit-earning capacity of the plant in detail. In its administrative aspects it involves the following points :

Plant selection.

Plant statutory requirements.

Power and fuel supply.

Power transmission.

Plant maintenance.

Pattern and tool control.

Hygiene.

Fire and accident prevention.

Fire, accident and engineering insurance.

Plant records and depreciation rates.

The elements entering into plant selection are mainly as follows :

Cost of the necessary operating personnel,

Cost of the necessary auxiliary personnel,

Cost of tools and their upkeep,

Cost of power and/or fuel,

Cost of floor space occupied, lighting and heating,

Cost of fixed charges, particularly interest, insurance, depreciation and risk of obsolescence,

Cost of attendance and repairs,

Efficiency and economy of performance.

There may be questions, not easily answered in terms of money, of the liability of the plant to stoppages and the cost of personnel standing by during stoppages, as well as the cost of putting matters right.

Plant Maintenance is usually the key to plant efficiency, granted that the right type of plant has been selected, and needs to be carried out methodically and intelligently. Plant inspection should be thoroughly organised to ensure the proverbial "stitch in time." An important and continuous economy may be effected by maintaining only a minimum regular maintenance staff, and giving out large repair jobs to outside contractors. Detail costing of maintenance jobs is frequently not attempted because of the obvious expense and trouble, yet often the unseen wastes, which would be discovered if costs were rendered promptly and handled intelligently, can prove far more expensive than keeping the cost records that would enable the waste to be checked. Payment by results can be applied to many maintenance jobs with advantage.

Plant Statutory Requirements, prescribed under the Factory Acts, are referred to in detail in Chapter IX and cover many important matters, such as hygiene, emergency exits and fire escapes, fencing of machinery, first-aid facilities, inspection of boilers, testing of lifting tackle, limewashing of buildings, accident records, etc.

Students who wish to gain at this stage a fuller insight into the subject of organisation for production, but whose time is nevertheless restricted, are recommended to read :

- 1 *Principles of Production Organisation and Planning*.³⁹
- 2 *Principles of Production Control*.⁹
- 3 *Production Control in the Small Factory*.¹⁰
- 4 *Application of Production Control*.¹¹

CHAPTER V

ORGANISATION OF DISTRIBUTION

The true sources of sales are often ideas, originating in the Research Department or the Design Department or occurring to the Sales Manager or to members of his staff, which when tried out through Product Development result in lines which make a strong appeal to the consumer and enhance the reputation of the producer.

A peculiar feature of the Sales function is that so much of its active operation is external to the industrial concern, whereas the other functions operate mainly within it. Subject, therefore, to maintenance of quality in production, the reputation of a firm is to an important degree in the hands of its sales representatives.

In the case of exports, sales representatives in other countries are in some degree ambassadors ; and the manner in which they exercise their function may affect appreciably the reputation of the country of origin of the goods, as well as of the firm which makes them. The total effect on international relations of the trade policies of industrial countries and the sales campaigns and practices of their exporters may thus be considerable.

IN an earlier chapter attention was called to the controlling and independent position acquired by merchants—the more important of whom were often spoken of as merchant princes—and to the growth of production on the lines of separate industries disposing of their product in bulk to the merchant for distribution direct to the retailer in the home trade, and through the merchant's own overseas branches to retailers abroad.

Industry, as represented by the manufacturer, and commerce, as represented by the merchant, became in this way distinct functions under separate control. In later years both have extended their field and scale of operations enormously. Industry now sometimes includes distribution not only to the retailer but in some cases to the ultimate consumer, and manufacturers thus conduct within their own organisation the duties that were for so long the peculiar province of the merchant. The merchant has become the wholesaler, carrying

on such distribution as the manufacturer does not find it profitable or convenient to do for himself. Manufacturers in such trades as boots and shoes, clothing, food-stuffs, etc., occasionally own their own retail shops, or use other methods of selling their products direct to the consumer.

Further, there have grown up department stores, co-operative stores and multiple or chain shops, which are retailers, but whose operations are on a scale to justify their being called merchant retailers, and whose purchases are so large as to enable them to obtain at least as favourable terms as wholesalers. A few indeed, operating fixed-price chain stores, come near to employing the manufacturers, as used to be the case in earlier days of industry, by fixing their own specifications of commodities required and inviting tenders. Manufacturers are, in fact, in increasing danger of losing all their distributive freedom by relying on the retention of very few outlets only for their goods. It may be remarked, however, that some suppliers to large users of certain commodities, such as coal, iron, and wheels for motor-cars, have never had much freedom.

The number and aggregate turnover of retail shops* in Great Britain in 1930 have been estimated by S. P. Dobbs² to be as follows :

Type of Shops.	No. of Shops or Branches.	Aggregate Annual Turnover.	Average Annual Turnover per Shop or Branch.
Unit Shops .	500,000-600,000	£1,000,000,000	Under £2,000
Multiple Shops (five or more Branches) .	30,000	£300,000,000	£10,000
Co-operative Stores .	10,000	£200,000,000	£20,000
Department Stores .	1,000	£150,000,000	£150,000

This estimate excludes expenditure, amounting to over £250,000,000 annually, on alcoholic liquor (other than that sold by grocers and wine merchants). Apart from alcoholic liquor, a large volume of goods reaches the public through channels other than ordinary shops dealt with in the above estimates. These other channels include hotels and public-houses; schools,

* v. " Britain's Shops " in the *Economist*, 27th April, 1946.

hospitals and other institutions; street hawkers; stalls, kiosks and automatic machines at railway stations, places of public amusement, and in the home; as well as direct distribution from the manufacturer to the consumer by house-to-house canvassing or by mail order.

Commodities that are offered for sale may conveniently be considered, for purposes of discussion, as falling within three categories :

“ Retail ” Goods.

“ Industrial ” Goods (other than “ Capital ” Goods).

“ Capital ” Goods.

The distinction is admittedly arbitrary, but for present purposes it will be assumed that Retail Goods are those goods that are sold by retailers to the public generally; that Industrial Goods are those goods sold to manufacturers for the purposes of their manufacturing processes, and/or for re-sale; and that Capital Goods are those goods, such as machinery, ships, houses, by whose use (as distinct from re-sale) profits may be earned.

Under the above definitions a door-lock bought by a householder would be Retail Goods, while if bought by the builder (presumably in quantities) would be Industrial Goods. If the builder uses these locks for a factory, when the factory comes to be disposed of they will have become part of Capital Goods. Taking another example, wool sold to the cloth manufacturer would be Industrial Goods, but when sold as cloth by the yard or in a garment to the public would be Retail Goods.

The definitions are offered only to assist in indicating below the channels through which normally each class of goods reaches the ultimate consumer or user. There is no set rule, and any channel may be used in appropriate circumstances.

Retail Goods.

- | | |
|--|----------------------------|
| (a) Manufacturer or Grower to Wholesaler. | } Retailer to
Consumer. |
| Wholesaler to Retailer, or | |
| (b) Manufacturer or Grower to Retailer, or | |
| (c) Manufacturer or Grower to Consumer. | |

Industrial Goods.

- (a) Manufacturer or Grower to Merchant. Merchant to User, or

- (b) Manufacturer or Grower to User—particularly where the use of such goods necessitates maintenance contracts and/or use of specialised supplies.

Capital Goods.

Manufacturer to User—many through merchants, factors, or hire-purchase organisations; and some classes not sold, but rented on a royalty basis.

For certain staple commodities the appropriate Produce Exchange * constitutes a vital link.

Through whatever channel an article passes in its journey from producer to user there are certain contacts to be made, certain things to be done to the article, and certain arrangements to be made to ensure that supplies are available at the time, at the place, and in the condition required by the ultimate user.

These are all separate and distinguishable parts or factors of the distributive function; and, whoever are the parties who make up the distributive chain, the problem of distribution is in essence simply the problem as to which of the parties in each particular case shall undertake which of the duties.

The next step must therefore be to consider these factors in some detail.

FACTORS IN DISTRIBUTION

In *The Distribution of Consumable Goods* by Braithwaite & Dobbs² the following classification of the factors in distribution is adopted :

Information.

Preparation of Goods for Sale.

Transportation.

Holding and Financing Stocks.

Advertising and Sales Promotion.

Information.—The classification given above attracts attention by the emphasis on the function which is given the name “Information,” which is defined by the authors in the following terms :

“First, then, among the essential selling operations we may place that of making and maintaining effective contact

* See p. 158.

between buyers and sellers—in other words, of finding out about markets and customers, and telling customers about the kinds, the quantities, the qualities and the prices of the goods which are being offered for sale. In a sense, indeed, all the remaining marketing activities are subsidiary to this main business of bringing buyer and seller together, which we may conveniently describe under the collective heading of information.

“The cost of obtaining information about possible markets and prospective customers varies enormously according to the type of commodity being sold, the length of time for which it has been on the market, the length of time during which the particular manufacturer has been producing it or the particular trader handling it, and other factors of a like nature. A newly-established firm marketing a new product, or even an old firm manufacturing or proposing to manufacture one with which it has hitherto had no experience, may quite legitimately spend vast sums on exploring possible markets and finding out individual purchasers; whereas an old-established manufacturer or trader who has been selling the same article for years may spend very little indeed.

“Even in the most favourable conditions some expenditure on obtaining information is necessary. Similarly, a certain minimum of information must be supplied to customers, if only to the effect that an article is or is not available at the time, at the price, and in the quantity required. More usually a considerable portion of a salesman’s time is devoted to the task of supplying information—sometimes indeed the whole of it. The traveller with his samples; the shopwalker with his rolls of cloth of various textures, colours and qualities; the manufacturer or department store with their catalogues, show-rooms and shop windows; all these are busily engaged in supplying information to the buying public. At the other end of the scale, the supply of information merges into advertisement: the two indeed are often scarcely separable, though the one is, whereas the other is not, a necessary and essential part of the business of distribution.”

Preparation of Goods for Sale.—In the distribution of staple commodities it has always been the function of the merchant or wholesaler to prepare goods for sale in such ways as grading to conform to local market-standards (as in the example of

, leather), blending of produce (*e.g.* tea and butter from different sources are blended to suit various markets) and other forms of preparation for sale in acceptable units and containers.*

In the sphere of "retail" goods as defined earlier, there has been so large a development in the adoption of proprietary brands that it is becoming the rule rather than the exception for the manufacturer to pack goods of this class in (branded) containers and cartons in a unit form, ready for the retailer to hand over the counter. Even when the wholesaler intervenes, as he often does on a large scale, and buys in bulk from the manufacturer, he, in packing the goods for the retailer, very commonly applies his own brand, or requires the manufacturer to apply a brand on his behalf.

Brands are a species of trade-mark in the form usually of coined words which may be used in any setting in any printed matter or advertisement; whereas a trade-mark is essentially a device of which the precise design is an essential part. Brands and trade-marks require, if the owner is to uphold his claim to either, to be registered at the Patent Office.† In practice many names of firms have acquired by usage the same proprietary right as if they had been registered originally as brands or trade-marks, *e.g.* Thornycroft as makers of ships, motor vehicles, etc. In point of fact, actual personal names may not be registered in this way. Registration has to be made separately for each distinctive class of goods, and registration in one class does not prevent the same brand being registered in another class by some firm of quite independent interests. There are, for example, Emu Wines and Emu Knitting Wool, which are made and marketed by entirely separate undertakings.

The purpose of proprietary brands is to enable the commodities made by the proprietor to be identified, so that any prestige they may gain will attach to them rather than to the retailer. This has led to the use of advertisement for building up a "reputation" value which is not infrequently out of relation with the intrinsic value of the goods, in comparison with the competitive makes sold under less well-known brands or not branded at all. It is this use of advertising that the authors, above referred to, distinguish as non-essential to distribution.

* See p. 138.

† See Vol. I, Ch. I.

Transportation.*—Just as many goods may have to be packed in what may be called “retail” containers, so these in turn may have to be packed in cartons for safety in transport; and in certain circumstances, cartons may have to be packed in suitable packages such as wooden cases or the like, or more recently in “railway” containers, for economy in transport. Where rapid delivery from door-to-door (manufacturer to customer) is important, or where goods are fragile (*e.g.* biscuits, for which both conditions obtain), road transport may be preferable to rail transport, irrespective of cost.

Quick and certain transport, particularly as to time and freedom from damages as well, reduces the stocks required by the manufacturer, retailer, and consumer or user. This can effect therefore a large saving in working capital.

The problem generally is one that has been accentuated by competition at low selling-prices compelling quantity production, thus necessitating distribution (and therefore transportation) on a national scale to dispose of the large quantities produced.

Costs of transportation to the consumer can be an important factor in determining selling-price policy, and careful study is necessary beforehand to determine the most economical arrangements which can be combined with adequate service. The mail-order system, by which the Parcels Post or other transport agency is used to reach the consumer in one step, has the virtue of consolidating transportation costs and effecting probably an economy on that head as compared with the use of middlemen.

The increasing tendency for “industrial” goods to be purchased in small quantities to obviate the buyer holding large stocks is assisted by the tendency of selling prices, through competition, to remain much the same for small monthly purchases as for quarterly or half-yearly purchases. This condition of trading is forcing new considerations of transportation policy in relation to selling policy, and *vice versa*. Closer analysis of distribution costs is therefore the more necessary to meet the situation. In this connection it is a sound rule to put the correct gross weight on every consignment note, as providing a basis for statistics of transportation costs by commodities and/or destination. It serves, incidentally, as a useful test, if need be, of complete delivery.

* See p. 122.

In considering inland transport there are various alternatives. There is the obvious choice between rail and road transport. There is the less obvious one, though well enough known, of conveyance by coasting vessels from port to port in conjunction with transport by rail or road to places further inland. The method is adopted where depots can profitably be established at strategic points around the coast. Such depots can be replenished in bulk by sea transport, and local area distribution effected by road or rail without delay. Sea transport not only costs less than any other form of transport, but, as compared with rail transport, the charges are on a logical basis of either weight carried or space occupied. Of recent years the railway companies have modified their own railhead services, and provide in effect public depots (for bulk consignments) from which local deliveries can be made to meet day-to-day demand. Canals, which fell into neglect with the coming of railways, are now being modernised, and may perhaps be expected to take the same active part in future in inland transport that they do in many other countries. The Manchester Ship Canal, which is an extension of sea transport rather than inland transport, has never ceased to be extensively used.

When goods are to be transported by ships there is a choice of three channels through which some part of the process of consignment may be effected :

1. *Through a Forwarding Agent.*—The forwarding agent is by way of being a general factotum for the manufacturer doing a small irregular export trade. The forwarding agent is prepared to receive small parcels and to pack them with other parcels for despatch to a given port, there to be unpacked and distributed. He carries through all the documentary work and in his field renders an important service.

2. *Through a Merchant.*—Where the order is received through a merchant, the manufacturer actually sells to the merchant, receiving payment on delivery of the goods to the ship. The services of the merchant have to be paid for by the acceptance of lower prices instead of by specific service charges as in the case of the forwarding agent. The manufacturer acquires no direct touch with his market and is therefore in some cases at a disadvantage, though frequently he stands to gain by the arrangement.

3. *Through a Shipping Agent.*—Where a manufacturer trades direct he makes most of his arrangements himself, such as packing, marking, and preparing invoices and Customs declarations ; but often he employs a shipping agent for the transactions necessary at the docks, such as receiving the goods, paying the dock charges, taking out the bill of lading and seeing that the goods are loaded.

Holding and Financing of Stock.—This function remains with the merchant in a great measure in connection with natural products, particularly those imported, such as cotton, wool, leather, metals, tobacco, tea, dried fruit, wheat, etc., in respect of each of which there are specialist merchant importers. It was at this stage that produce exchanges * were operated to centralise trading operations, standardise grades, and spread risks arising out of price fluctuations. The costs of merchanting produce of this type are passed on to the manufacturer in the cost of his raw materials. The same is true, of course, of the transportation costs up to that point.

The holding of saleable stock carries with it the responsibility for financing it, and for bearing the cost of money lying idle ; of the risk of stock deteriorating ; of the risk of changes in taste, fashion and demand ; and, not least, of the risk, with some commodities, of obsolescence through improvements by competitors.

With the development of trade in proprietary or branded goods the manufacturer has come to bear the burden, peculiar to such products, of preparing the goods for retail sale in approved unit form to a guaranteed uniform standard of his own, and of holding stock accordingly.

It may be noted that for retail goods of many kinds the container provided by the manufacturer for his sales unit (such as bottle, jar, carton, tin or box) has, according to its attractiveness, an important influence on sales : this introduces a new cost into production. The attractiveness of a container depends on the suitability of its design in all respects—including size, shape, stopper, lid or other means of opening, texture, colour, convenience and pleasure in handling, label or other lettering; etc. American manufacturers, in particular, attach great importance to these considerations. The outer box or casing in which the containers are packed for transportation can be a useful element in brand identification, and should be

* See p. 158.

well designed in respect of size, strength, utility, ease of opening without damage, and suitability for display.

Advertising and Sales Promotion.—Advertising may be looked on as a means of disseminating “information” by the published word. Sales promotion may be distinguished as the dissemination of “information” in other ways, by exhibition, personal canvassing, etc.

Apart from the use of radio (possible only from foreign stations), cinemas, and outdoor advertising, there are two main forms of advertising :

Press Advertising.

Direct Advertising by Brochure, Catalogue, etc.

The advantages of press advertising are generally acknowledged, though equally the need is admitted for very careful analysis of its effectiveness; and not all manufacturers are satisfied as to some aspects of such expenditure from the national point of view. The circulation of any publication, particularly when (as formerly) stimulated by gifts, is not necessarily a reliable indication of reader interest.

It is the function of the advertising agent to advise on the many questions involved in the proper choice of media (publications), the position and extent of the space to be bought, and the best use of the space. His remuneration is frequently derived from discounts allowed by the publications in which the advertisements appear, but some American and other agencies charge a percentage on the cost of the space.

The advantages of direct advertising can be set out in more detail, as given below, and the list may serve as a basis of comparison with press advertising.

Circulation.—Flexible. The advertiser can select his own circulation or mailing list by communities, by businesses, by professions, by social or executive positions.

Mailing Dates.—These can be exactly suited to the work in hand.

Timeliness.—Items of immediate news interest can be put into type and mailed while the interest is keen.

Unit of Space.—This can be whatever is necessary or desirable to promote the particular subject being promoted.

Cost per Unit.—The per-unit-per-reader cost of direct advertising may be low or high according to the character of the mailing.

Advertising Competition.—Direct advertising pieces usually are devoted exclusively to the business of a single advertiser.

Information to Competitors.—In a direct advertising campaign the scope of the effort is not apparent to competitors. The list may comprise one section of the country or all sections. It may comprise one hundred names or one million names.

There is, however, a prestige effect to be obtained from press advertising, that tends to make it an essential complement of direct advertising.

There is apt to be a great deal of waste in advertising, due in part to unwise expenditure, but hardly less to lack of foresight in the important directions of production, distribution and finance. So often advertising seems to be looked on as a throw of the dice made in the hope of securing by luck rather than management an adequate volume of new business. With so many competitors proffering their wares in this way, the only hope of winning through is by cumulative effect along carefully-planned lines, having due regard to all the considerations involved.

To eliminate the gambling feature of many costly campaigns operated from the start on an extensive scale, there should generally be an experimental test beforehand covering a comparatively small area. The preliminary trial should be conducted intensively, and every aspect of the campaign intelligently watched for its own success and reaction on other factors—not least on the selling staff. These points are made to the student to impress on him the insistent need for a scientific approach to this as to every other administrative problem. To apply this rule to advertising may seem to call, in some quarters, for unexpected self-discipline in “hastening slowly.”

Advertising is wasteful also when it amounts to reckless competition for a limited market, and most markets are inherently limited. The remedy for an insufficient sale is more likely to be the finding of new markets—either geographically, industrially or socially. The principal remedy for waste of this kind in advertising is for trades to advertise co-operatively or collectively. This enables each market to be more intelligently exploited, and in that sense expanded to the utmost. The share of this optimum market would then fall to each advertiser in proportion to the merits of his goods and after-sales service, and the skill of his distribution in conjunction with a suitable degree of individual advertising.

Skill in distribution of "retail" goods, consisting in having them available and on display to the public as effectively as possible, is hardly less important than merit in the goods. The retailer will, however, not become a "stockist," as it is called, of particular proprietary brands or makes of articles except he is assured of sufficient demand. It is the avowed purpose of advertising to create this demand by building up a "reputation" value.

Advertising effort requires to be suitably related in point of time with personal sales promotion efforts. A widely adopted method of discovering "prospects," or prospective customers, is to invite application for brochures or samples. In press advertising, the provision of a coupon for this purpose acts as a stimulus to the action of making application by simplifying the process; and—hardly less important—by suitable coding of the printed coupon serves to disclose the effectiveness of any advertising medium that is used (if it be assumed that those who apply are possible customers).

Prior to the second world war there was another form of coupon, known as a gift coupon, which was extensively used. It was looked on by many as impersonal sales promotion in that it offered an inducement, in the form of a choice over a wide range of gifts, to buy a particular brand of goods. The great extension of the system was largely a by-product of price maintenance * which had secured a gross margin so favourable as to invite competition in rebates in kind instead of by price reduction. Coupon trading is at least fifty years old, and before the second world war was diverting a large volume of business from the ordinary retailer of the class of goods available as gifts.

SALES ORGANISATION OF NATIONAL DISTRIBUTORS

In modern commerce it is generally true to say that selling in its most highly developed form is carried out by the large manufacturers producing for national distribution, and by department stores, wholesalers, and certain gas and electricity undertakings. A brief discussion of the lines followed in planning the sales organisations of such undertakings will therefore disclose most of the up-to-date methods of dealing with the various factors in the distributive function described above.

* See p. 145.

The organisation of the sales department of a national distributor commonly reflects the "geography" of the markets to be cultivated. Selling involves so many localised considerations that there is perhaps more to be said for specialisation or concentration on relatively narrow sections of the field than in any other aspect of industrial administration. This is recognised by the very common practice of having separate sales departments for home and export trade. The same need for specialisation has shown itself in the less frequent cases of separate sales departments or subdivisions according to type of product.

Sometimes there is specialisation according to the selling method, *e.g.* hire purchase, mail orders, etc. Or, again, according to type of customers *e.g.* departmental stores and multiple shops, wholesalers, etc. Distinction may be drawn also between the selling of branded and unbranded goods, or even as between different brands made by the same manufacturer.

A most important feature of sales organisation seeking a high standard of efficiency under modern conditions is the working out of sales potentials for each market. These potentials can be resolved into sales quotas or budgets.

Sales quotas, when properly constructed so as to reflect standards of living, buying capacities and other conditions governing the manufacturer's opportunity, serve four primary purposes :

1. To guide the settlement of sales promotion and advertising policies ;
2. To test the economy of distribution expenditure generally and arrive at its correct geographical apportionment ;
3. To measure equitably the efficiency of individual salesmen and retail outlets ;
4. To use sales forecasting as a basis for production and purchasing schedules.

Adequate measurement of market potentials will throw light on the question of allocation of territory to individual salesmen, which is likely to give valuable help in arriving at a minimum selling-cost per unit of sale. The unit of sale may be based on value or quantity according to the class of business, but for the most part values are used to measure all sales results.

The boundaries of sales areas are usually arbitrary, depending frequently on the circumstances of the company's growth

as well as the nature of its business. In the Home Market for a nationally distributed product, there is something to be said for adopting as Main Sales Areas the boundaries of the economic divisions of Great Britain used by the Ministry of Labour, because of the additional statistics of economic conditions that thus become available for measurement of sales potentials from time to time; though the business connection established by salesmen tends to prevent any rearrangement of territory merely to serve a statistical purpose. The boundaries adopted by the different Government Agencies and Departments, however, tend to have a confusing effect, and in settling Main Sales Areas consideration should be given to the coverage and natural flow of the goods in question. Where statistical measurements have been recognised as desirable, the more common basis has been the individual county.

Salesmen's Agreements.—A matter that exercises the minds of many sales managers is the kind of agreement or contract to be entered into with a salesman as to terms of employment, and the subject is likely to be interesting to the student.

In 1927 the Incorporated Sales Managers' Association issued a Report ³⁶ on this subject. The salient points that emerged may be stated briefly as follows :

1. That formal or written agreements with salesmen are almost invariably used.

2. That there is an overwhelming opinion in favour of allotting territories which are fixed and exclusive, subject to the right of the employer to change the territory.

3. That the system of remuneration should be so fixed that it never exceeds a predetermined maximum percentage of the value of sales.

4. That the "straight commission" plan, i.e. remuneration by commission only, is very little used now and that the general practice is to pay—

- (a) a guaranteed minimum salary;
- (b) commission on all sales in the allotted territory;
- (c) travelling expenses on an agreed basis.

5. That where travelling is done by motor-car the practice is favoured of salesmen acquiring the car on hire-purchase terms from the employer and being paid a "running allowance."

6. That whole time service is practically universal, i.e. that each salesman acts for one firm only.

7. That the employer can and does reserve the right to refuse any order taken by a salesman, and by so doing incurs no liability to pay commission.

8. That commission paid to the salesman in respect of sales that become bad debts is recoverable, *i.e.* may be "charged back," but no part of the bad debt may be recovered in this way.

9. That many sales managers consider it an advantage for salesmen to collect current and overdue accounts.

10. That restrictive clauses which prohibit a salesman from exercising his profession in a prescribed territory, after a contract has ended, are enforceable at law if the restriction is held to be reasonably necessary for the protection of the employer, but not in suppression of legitimate competition.

11. That, in the absence of provision to the contrary, reasonable notice for a salesman has been frequently held by the Courts to be three months.

12. That on termination of employment, commission is payable during the period of notice, but not beyond unless specifically provided for.

Agencies.*—There are two classes of agents. Those in the first class act as salesmen in the sense described above but on their own account. They enter into a contract for a given firm in a given district on a basis of commission without any allowance for travelling expenses. Sometimes they may be subsidised to the extent of a fixed yearly contribution towards the expenses of their office or showrooms. The agent undertakes not to offer competing goods of other makes, but as he often has so many "irons in the fire" the system fails sometimes for lack of the personal drive that is usually supplied by the whole-time salesman.

The second and larger class of agents is that of the stockists (either wholesale or retail) who actually buy the goods and re-sell. These selling agents, of both classes, act merely as distributors and are not agents in the legal sense, in which agency implies an extension of legal personality. That is to say, in law, any person employed by another is the latter's agent to an extent depending on the terms of the employment; and, in principle, the employer or principal is responsible for the actions of his agent or employee when the latter is acting under his orders or within the said terms. This obviously does not apply to selling agents of the sort discussed above.

* See Vol. I, Ch. I.

All correspondence, sales-literature and dealings should be considered from this aspect.

✓PRICE-FIXING

In the fixing of selling prices regard must be paid to the fact that prices are controlled by competition in general, rather than by the cost of a particular manufacture. It is true that in the long run selling prices must cover all costs, but the question arises as to whose costs. As the Balfour Report ²⁹ put it, "Producers differ in ability and opportunity; some have better equipped and situated works; some have better relations with labour; some have more successful advertising and selling organisation; some are in this country with similar conditions as to standards of living, while competing producers in other countries may be working under lower conditions. The competition of the efficient producer makes the trend of price towards the more efficient cost plus a profit. The less efficient makes a smaller profit, no profit or a loss."

Granted that selling prices tend to be fixed by competition, and that there is in effect a market value for all goods from which the individual manufacturer can hardly escape, he must relate his costs to that value as best he can. This necessity has led to the use of what is called the Sales Pound * method of administrative control. By this method each £ of sales (or, to avoid confusion with sales orders, each £ of sales turnover) is split up according to a formula to meet expenditure under different heads; and except each is kept within its quota, the quota allocated for profit will be drawn upon and may be absorbed.

Price Maintenance.†—It is almost a necessity for the continuance of proprietary brands that retail prices shall be maintained. The practice is adopted, in almost every instance, to provide the retailer with a suitable margin between the cost to him and the selling price. This requirement can be held to be in restraint of trade,‡ and by some is considered undesirable. A committee was appointed by the Board of Trade to consider this aspect, and published its report ³⁰ in July 1931; the following quotation from the report will be found sufficiently illuminating to need no further comment.

A man has the right to trade as he pleases. A manufacturer or merchant may refuse to sell his goods to anyone

* See Vol. I, p. 125. † See Vol. I, pp. 9 and 79. ‡ See Vol. I, pp. 8 and 77.

who wishes to buy them, or he may sell them on such conditions as he thinks fit to impose. If the buyer of goods who has acquired those goods subject to terms or conditions subsequently deals with them in a manner contrary to the terms of his agreement he commits a breach of his contract with the seller, and the seller has a right of action against him. But if the goods have come into the hands of a third party who proceeds to deal with them in breach of the conditions which were attached to the original sale, the seller has no right of action against the third party, for there is no privity of contract between the two. In other words, a manufacturer who sells only to a wholesaler may have a right of action for breach of contract against the wholesaler, but if the goods have reached the hands of retailers the manufacturer has no right of action against retailers who dispose of the goods on terms which are not in accordance with the bargain between the manufacturer and the wholesaler; whether the wholesaler has any such right depends on the terms of his contract with the retailer. The manufacturer may, of course, impose upon the wholesaler the obligation of requiring an undertaking from the retailers with whom the wholesaler deals, and of taking steps to enforce such undertaking in the event of its breach; but this does not entitle the manufacturer by legal process to enforce the undertaking against the retailer.

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In the case of a patented article a patentee is in a stronger position than the ordinary manufacturer; if at the time of making his contract a sub-purchaser of the patented article has notice of conditions attached by the patentee, he is bound by them, and if he deals with the articles in breach of the conditions attached by the patentee and of which he, the sub-purchaser, has notice, an action will lie for infringement of the patent. In this way in the case of patented articles a condition fixing the price below which goods shall not be sold can be made to run with the goods.

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The imposition of conditions upon retailers and wholesalers regarding the re-sale prices to be charged is a widespread and growing practice among manufacturers; and it

is common to enforce the conditions where necessary by threat of individual or joint boycott, or by actual boycott.

The system varies in detail from trade to trade and it seldom affects the whole of a trade, while in many cases, it affects only a small part. Among the trades in which it is most prevalent are books, newspapers and periodicals, stationery, drugs, photographic goods, gramophones and records, motors and cycles, tobacco and cigarettes, confectionery and groceries. It is less widespread in the drapery and clothing trades. Some traders, especially those who handle fashion goods or highly perishable goods are scarcely affected. The system, however, appears to be extending to different branches of trade.

In general the goods which are thus price-maintained belong to the class of branded goods which are distinguished by bearing the manufacturer's proprietary label or trade-mark. Not all branded goods are, however, price-maintained, and we were informed that of the goods stocked, for example, by an ordinary grocer, one-sixth might be branded goods not subject to price restrictions, one-third price-maintained branded goods, and the other half non-branded goods, including bulk goods not regulated by the supplier in regard to retail price.

Branded goods which are widely advertised are, however, nearly always price-maintained, and the system of price maintenance is clearly associated not only with the proprietary label or trade-mark, but also with the advertisement.

Where a particular shop cuts the price of an advertised branded article, neighbouring shops can only sell the article if they do likewise. If the price is cut to a point which yields little or no profit to the retailer, he either ceases to stock the article or, if he is compelled to stock it in order to meet the insistent demands of his customers, he at any rate refrains from displaying it and endeavours to push the sale of some other article yielding a larger margin of profit. The manufacturer finds that his sales fall off. In the end the price-cutters, finding that the article is less effective as a bait than it was formerly, decide to resort to something else for that purpose. The net effect is that the price-cutter has

succeeded in diverting to himself a more or less substantial part of the value of the advertising done by the manufacturer.

There can, in our view, be no doubt whatever that the system of price maintenance which has grown up independently in a number of trades is aimed principally at the elimination of the effects in question; and to regard the system as one directed primarily, or indeed to any real extent, to the imposition of excessive prices upon the public is in general to view it from the wrong angle.

In some cases where goods are distributed through wholesale firms, manufacturers specify not only the retail prices, but also the trade price chargeable by the wholesaler to the retailer. The latter price, like the former, may be either a definite price or a minimum price.

*Report of Committee on Restraint of Trade.*³⁰

It might appear that price maintenance serves to free the manufacturer from competition, which is the most potent force for bringing manufacturers into trade association. Price maintenance, as referred to above, had reference to the manufacturer controlling the selling price of his own products. In some trades, most notably that of cigarettes, control is in so few hands as to enable price maintenance to be general to the trade rather than peculiar to the manufacturer. Competition between members takes, in that event, the form of additional advertising or coupon gifts, or both. In trades dealing more with "industrial" goods, trade associations of the manufacturers are able sometimes to form what are called "price rings" * to maintain prices generally. These schemes are sometimes more nominal than real, and a system of rebates either open or secret for quantity orders may make the price control largely ineffective. A patent may give a monopoly position for a time to a manufacturer, but in general there is no real defence but efficiency against competition.

Henry Smith⁶⁶ comments "The producer of branded and price-maintained goods is a quasi-monopolist. He may share his monopoly profits with the retailer, thus widening the retail margin in the trade concerned and, by allowing a smaller investment in stocks to provide a livelihood, increase the number of

* See Vol. I, pp. 77-80.

retailers. Or he may in part *derive* his monopoly profit from the retailer, thus narrowing the retail margin and either tending to reduce the number of retail outlets, or, where the retailer is in a position to recoup himself, causing the distribution of his product to be subsidized out of widened retail margins on other goods handled by the retailer."

EXPORT TRADE

Before any step is taken to enter any overseas market, the fullest use should be made of the resources of the Department of Overseas Trade. The information, statistical and otherwise, which can be obtained regarding the requirements and possibilities of each market, the standing of agents, customs regulations, etc., is acknowledged by British firms of considerable experience to be really reliable and useful.

In some countries there are trade organisations representing importing interests, from which help can be obtained.

The respective British Trade Associations at home should be able to assist even more than they do, or are given the opportunity of doing. They should know everything there is to be known about economic conditions and local trade practices, not to mention information of financial penetration by other national interests which may virtually close the market except on a similar footing. They might even have a mailing list of the prospective customers in each country for each kind of product—mailing lists which are kept up to date, a vital condition not easy to maintain. They should be thoroughly conversant with each country's requirements in the trades they claim to serve, maintaining widespread correspondence, and, perhaps, sending out commissioners occasionally.

This is largely a counsel of perfection, because it would cost money on a scale that would mean much higher subscriptions than obtain at present. That it would pay, and pay handsomely under proper direction, initiative and driving power, is indubitable. Fortunately, British associations are carrying out very ably a great part of the programme indicated above. Mention has already been made of *The British Export Trades Research Association* (BETRO).* The *Export Groups* formed during the second world war should prove to be of still greater value in peace time, especially if they have adequate oppor-

* See p. 54.

tunities of satisfactory and fruitful collaboration with some such organisation as *The United Kingdom Commercial Corporation Limited*; and there is a very active *Institute of Export*, whose *Guide* ³⁸ is most practical, informative and helpful.

Marketing overseas falls mainly into two categories :

Selling by Tender ;

Selling by Price List.

By "selling by tender" is meant selling, and therefore making, to the customer's specification, and by "selling by price-list" is meant selling, and therefore making, to the manufacturers' own specifications.

Selling by Tender.—In "selling by tender" overseas, three salient features to be borne in mind are, that there must be—

Local representation ;

No language bar to obtaining local knowledge ;

A financial organisation at home to co-operate with the selling organisation abroad.

Local Representation.—It seems clearly established that the local representative should be technically qualified, and that he should be British.

When it is clear that a given market ought to be cultivated, a substantial financial appropriation needs to be made for the purpose, sufficient to cover an adequate sales development scheme under the man entrusted with the task. As this may involve many thousands of pounds, it will be clear why only large undertakings can carry so large a burden. To get established in a new overseas market means two or three years' hard work, and it is useless to try this unless the necessary financial backing is assured.

The fact that so much preliminary expenditure is necessary to get a foothold in a new market has naturally led to the institution of an organised method of examining the potentialities of each market before plunging into any protracted commitments. Interesting developments have taken place in China, where British locomotive manufacturers have combined in a selling organisation in which there is no sinking of individuality or pooling of selling interests, but there is co-operation to enhance national prestige and prevent one firm being played off against another. The motive that brought

about this association of sales managers was the safeguarding of credit.

The more usual grouping of interests overseas is by an association of non-competing firms, but this falls equally under selling-by-price-list and can be discussed better under that head.

A vital feature of local representation when selling by tender is the getting of early knowledge of contracts pending. By the time such knowledge has reached this country by ordinary channels it is apt to be too late. By early knowledge, preliminary tenders can be rushed in, and the necessary references to home headquarters regarding price and delivery made before lodging the final tenders. In all such negotiations it is obvious that close contact with the organisation requiring the goods is of first importance.

Language.—The necessity for close contact just mentioned makes it obvious that there must be no language barrier. There can be no understanding of local conditions except the local representative can both speak and think in the local language. So high is the standard of linguistic ability required that experience favours the appointment of native assistants. The man in charge has to know the language at least well enough to control his assistants, and must make his own local social contacts with citizens.

Finance.—In selling by tender, finance or credit is likely to be a controlling factor that may easily prove the greater part of marketing. The linking up of manufacturing and financial interests is an increasingly important feature of export trade. Separate investment companies * for this purpose are quite usual, and for international trading are necessarily on a large scale. They may secure their position by taking up debentures or shareholdings in the overseas corporations which are desirous of obtaining credit for the placing of contracts with the manufacturing company or companies with which the finance company is allied.

State schemes for export credits were initiated in 1919, and the position to-day rests on a continuance of the *Trade Facilities Act*, 1926. The following description of the system is taken from the Balfour Report : ²⁸

“The Export Credits Guarantee Department guarantees the payment at maturity of sterling bills of exchange drawn

* See Vol. I, p. 93.

on buyers overseas in connection with the export from this country of goods wholly or partly produced or manufactured in the United Kingdom, including coal. Munitions of war, goods already shipped (except, in certain cases, goods shipped on consignment from stocks), and certain transactions on open account are excluded. Applications, which are made through a bank, are considered for long-term as well as short-term credits. Exporters may obtain :

- (1) Facilities of an insurance character by which the guarantee is given without recourse to the exporter. In these cases the guarantee will not exceed 75 per cent. of the amount of credit granted to the importer ;
- (2) Facilities of a financial character by which the guarantee is given with full recourse to the exporter. In these cases the guarantee may be for the full amount of the credit granted to the importer ;
- (3) Facilities of an intermediate character by which the guarantee is given for the whole or part of the credit, either without recourse to the exporter or with such recourse as may be agreed. In these cases the exporter will not be relieved of more than 75 per cent. of the risk on the bill unless approved security is provided.

“ These facilities are available in respect of specific transactions, but sometimes the Department gives guarantees up to a fixed amount for transactions with a number of importers in a particular country or countries. General guarantees are intended only for cases where the credit granted does not exceed six months. Approved banks, bankers, credit associations or companies providing credit insurance may also secure the Department’s guarantee against loss on specific transactions.

“ Applications for guarantees are submitted to an Advisory Committee. The Department charges a premium, varying according to the circumstances, for the granting of its guarantee.”

Selling by Price-List.—In making and selling to the manufacturers’ own specifications a totally different set of conditions obtains, though the three features mentioned in connection

with selling by tender remain in name if varied in form, viz., Local Representation, Language, and Finance.

Direct representation is not equally imperative because, the product being to a large extent standardised, there is not the same necessity for specialised technical knowledge of the manufacturers' capacities in regard to design and production. Neither is there the need for the inside knowledge which is necessary to the preparation of preliminary tenders.

Direct representation is so costly if carried out effectively that only large-scale business will allow of it. This fact has led to the development of group-representation of non-competing firms, which is really direct representation by co-operation, in that the representative is in the service of the group of manufacturers concerned. Representation by local agents remunerated by commission is of older standing. Here great caution has to be exercised in the choice of agents and not always is it safe to use a native agent. An old-established method in China, for instance, was to operate through European importing houses. Local distribution was then effected through native dealers, but their business was received by the merchant house through a native "compradore" of financial standing who guaranteed their accounts.

One problem with agents is that they are not so much under control as representatives, and are always out for the easiest business. This means they may neglect some of the lines for which they hold the agency. They may indeed deliberately take up agencies to secure a subsidy or to prevent them getting into other hands, but with little or no intention of working them thoroughly.

An agency arrangement, commenced at least thirty years ago by Americans in developing their machine tool trade in England, is for the manufacturer to supply and pay for a technical specialist to assist the agency. The alternative arrangement under which an agent takes and pays a technical assistant supplied by the manufacturer, however, leaves the manufacturer with no control of the agent. No scheme of sharing technical men seems to work; and to control the agents properly, both technically and from the trading point of view, the manufacturer must send out his own man, whether he be called a Factory Representative or any other similar name.

The language question alters in character, in that particulars of a standardised article can be prepared in the language of the country, and so lessen the dependence on conversational propaganda.

There is, however, one language which is universal and requires no interpretation or translation anywhere, and that is pictorial representation. Informative material should therefore partake mainly of illustration, with a minimum of text. Further, it should show the product in service for the particular trade that is being cultivated. For instance, in trying to sell motor vehicles in an agricultural country they should be shown transporting local produce. This may seem to assume a low standard of imagination on the part of buyers, if they cannot see for themselves the applicability of the product to their business. Unfortunately, buyers the world over are not interested in exercising their imagination in the manufacturers' interests and must be catered for accordingly.

Certainly each picture must tell a story and make its appeal irrespective of the text, brilliant as that may—or may not—be. The only text, moreover, that a buyer of technical products wants is data of performance. As it happens, for foreign trade, such data may be expressed in other languages without endangering the meaning. Measurements and values should also, of course, be converted into the terms in use in the country to which the appeal is being made. It should not be hastily assumed either that the metric system is the only alternative to the English system, though it is quite sound to give, even in publications in English, the metric equivalents of English data. The customers' characteristics (including those of physical proportion) and national habits need to be studied. The goods advertised should be appropriate to the climate and conform to any local regulations, and should not contain features which are likely to be regarded with disfavour for one local reason or another. In some countries, for instance, colours have a social significance, and it is important to submit to the overseas representative all proposed information material in proof form. This will provide also for checking the translation of technical terms, which in the same national language may require different words in different districts. Owing to the considerable risk of wrong setting by foreign printers, it is good practice to supply electros for any foreign press advertise-

ments, having first had the copy checked as already suggested for postal material.

The importance of persistent publicity can hardly be over-rated ; and whatever may be done in the local technical press, where there is any, the main reliance should be on the pictorial folder sent direct by post to the right persons at frequent intervals. Advertising, to be effective, must be continuous, for it is only by cumulative effort that prestige is established and sales resistance broken down. The rule applies as much in direct mail advertising as in press advertising. With " capital " products, too, the demand is infrequent, and the impressions of the brochure sent in January may have faded by the time there is occasion to buy in, say, September. Month by month, or quarter by quarter, there needs to be some reminder of the product on offer, and the reminder is a reminder only if it is attractive enough and brief enough to win attention and perusal.

With regard to finance, this is not less important in selling by price-list than in selling by tender, and in some respects it is more troublesome because of its continuous character. For the large contracts that selling by tender implies, the financial arrangements, once made, cover a correspondingly longer period. With standardised products the financial problem may arise on each article sold.

With some technical products there is likely to be another problem, mainly financial, arising out of the necessity for carrying stock and providing an " after-sales " technical service. This requirement reacts on the question of whether there should be direct representation or whether agents should be used.

In practice, the British manufacturer, who is endeavouring to develop overseas business, finds in many cases that satisfactory and permanent business cannot always be done through agents, and, even when it is done through agents, some further backing is necessary on his part—in other words, he must open a branch for the purpose of carrying stock, giving service, etc. and for the management of his agents.

The opening of a branch carries with it the disadvantage that the manufacturer is unable to get cash quickly for his exported products ; and, as in most instances his capital is insufficient to stand this extended credit in a number of coun-

tries in different parts of the world, he is, therefore, compelled to think of some scheme by which he can get his cash.

If he is exporting to well-established firms, he can, of course, by arrangement, draw upon them against shipping documents in this country, but if he is exporting to his own branch he cannot so draw. The best method of overcoming this difficulty appears to be the formation of a branch company in which the manufacturer can keep the controlling interest, while at the same time getting the other capital necessary for the branch company subscribed on the spot.

If the manufacturer is exporting an article which is readily marketable and is able to provide a sufficient margin for marketing between cost and selling price, the problem of securing the necessary capital on the spot should not be difficult. Once the company has been formed, the home manufacturer is then in the position of being able to draw on the branch company against documents and discount his bills on this side, though exchange restrictions may interfere with this plan being carried out.

In considering the formation of subsidiary companies overseas, careful regard must be paid to the law and taxation in the chosen country, and safeguards must be established to secure absolute permanent control by the parent company.

The subsidiary company arrangement permits the local manager to take on the status of director with its prestige without holding a similar position in the parent company.

Apart from questions of finance, the formation of branch companies permits certain tariff advantages and gives certain psychological advantages. The Americans, for instance, have for these reasons established many subsidiary assembling companies in Canada and in the United Kingdom.

A financial point of importance is that of protection from bad debts. With direct representation on the subsidiary company, the question is one of ordinary administration, as the financial standing of the prospective customer will be investigated before an order is accepted. In operating through an agent, however, special arrangements are necessary. If the agent buys from the manufacturer, the latter knows nothing of the ultimate purchaser and cannot accept any responsibility. If the agent is merely acting as introducing the business on commission, the commission will not be sufficient to cover bad

debts and the manufacturer will have to accept full responsibility. A *Del Credere* commission * covers bad debts.

The foregoing discussion relative to selling by price-list, while it may imply standardised products which may be catalogued, does not imply standardised net prices. List prices are therefore subject to a discount which is quoted according to the conditions of each inquiry and other current factors. Inquiries reach the home manufacturer frequently through merchant houses; and there is a temptation to quote discounts which assume that there is no need to provide for any costs subsequent to the delivery of the product to the docks.

It is obvious that merchant houses cannot provide any after-sales service to the overseas customer, and it may be argued that it is reasonable that net prices should be lower on that account. Unfortunately, without an after-sales service including, not least, that of spare parts, there is likely to be dissatisfaction on the part of customers, and in the end very considerable harm is done to British trade and British prestige. Manufacturers who do not take long views, and who think that an order in hand at a cut price is better than a reputation for service, are doing themselves little good and doing their fellow-manufacturers considerable disservice.

The case for direct representation, by means of either a branch or an agency, is therefore very strong for many technical products that are standardised. Sometimes when there is direct representation, inquiries still reach the home manufacturer through a merchant. To guard against overlapping of quotations, it is desirable to find out from the merchant as much indication as possible of the destination of the goods, and to cable the information to the local representative. It is likely to be found in such cases that the local representative is in touch with the business, and that someone is endeavouring to check prices or to see whether they can get an extra discount, bigger than the discount offered to them on the spot.

A matter of importance, to which frequently too little attention is given, is the personal relationship between the home manufacturer and representative abroad, whether an employee or an agent. The representative cannot be too fully informed of the manufacturer's progress, and the more personal the touch the better. Usually the manufacturer operates as a

* See Vol. I, Ch. I.

company and is personified in consequence by a managing director. On the managing director, therefore, or in some instances on the sales director, lies the onus of seeing that the representative is remembered regularly and not spasmodically. Some adopt the excellent practice of a monthly confidential letter, which is really informative of the company's progress and programme. To the man who is stationed abroad, this monthly communication is a real stimulus. It is a recognition that in his district or country he not only represents the company, but for all local purposes, although an employee, he is the company; and the consciousness of being in confidential relations with the directorate will help him to sustain and develop the prestige of the company.

Again, when the representative visits England, whether as an employee on leave or as an agent on a business visit, the fullest use should be made of the opportunity to show him what is going on in the works, and in the selling organisation at home and abroad.

This advice assumes that the representative deserves this consideration and attention; but if he does not, then he is not a fit representative. A representative who is not trusted is deprived of half his fighting strength. Trust is not trust when it is limited to fair words and finds no expression in action.

It is equally desirable for a director to visit the overseas branches every few years. Such visits put the Board of Directors in a position to determine with more confidence their marketing policy for each country, and particularly perhaps the amount to spend in publicity and the form it should take.

PRODUCE EXCHANGES

In the first half of the nineteenth century the rapid expansion of domestic and international trade was facilitated, and one of its growing difficulties was eased, by the institution of a number of Produce Exchanges.* They functioned satisfactorily in the great trading period which developed and until its termination by the first world war. In this, and in the

* The earliest Exchange seems to have been formed in London about the middle of the eighteenth century, by merchants engaged in business with the Baltic ports in Russia. It operates to-day in grain and other commodities, as the "Baltic."

second world war which so soon followed, the activities of the produce exchanges suffered a protracted eclipse over wide areas. Present indications seem to be that, with the spread of Government control and direction and the initiation of its active conduct of industry, that eclipse will become total and permanent; and that to Government departments or sub-departments will be entrusted the functions formerly performed by produce exchanges. The following notes show briefly how these have functioned hitherto, but in the next few years they may acquire a progressively historical interest. The student who is interested in the subject is referred to *Produce Exchanges*⁶⁷ by Professor J. G. Smith, from which source mainly the notes have been compiled.

Exchanges exist as an important element in the distribution of certain commodities which are of fundamental importance in world trade, of world-wide consumption, and produced in exportable quantities only in certain definite areas of the world. Only such of these commodities as can easily be graded and of which the supply cannot readily be adjusted to meet sudden variations in demand are, however, dealt in on Exchanges. Neither perishable nor made-up or assembled goods are dealt in.

Perhaps the principal characteristic of an Exchange is its highly-developed technique for permitting speculation which, when not abused, performs a valuable service to the market in steadying prices. It may be defined as the assumption of risks of price fluctuation in a commodity over a period of time, the speculator counting on his superior ability in the forecasting of the probable course of the market during this period to provide him with his profit.

Not all exchanges serve this function of speculation, and a notable exception, except to a very trifling degree, is that of the Manchester Exchange, which is none the less an exceedingly important market for yarn and manufactured cotton stuffs.

In England, Exchanges are voluntary associations, organised usually as joint-stock companies—possessing no privileges, and subject to no supervision other than falls to the lot of other joint-stock companies. They differ from those in other countries in being unimpeded by special enactments or by governmental interference.

Membership of an Exchange is usually obtainable by

election and payment of entrance fees, together with the acquisition of a share in the joint-stock company owning and operating the Exchange. An Exchange is not, however, an organisation for the making of money or entering into contracts. It merely provides a meeting-place, prescribes rules for the conduct of business, and maintains an arbitration council for the cheap and speedy settlement of disputes, which would otherwise be fought out at great expense in the Law Courts. It also acts as an information bureau concerning the commodities dealt in, and its official report of prices is an extremely important service for the business community generally.

Grading is an important and necessary condition of business on Produce Exchanges. Unless commodities can be bought and sold by reference to a standard quality, either by sample or description, it is impossible for speculative transactions to take place. Grading and providing for the existence of facilities for storage of graded commodities are therefore a vital part of the work of a Produce Exchange. So important is this feature of the marketing of raw materials, that in late years some Governments have undertaken the task of establishing certain standards—notably the U.S.A. Government in the case of raw cotton and grain, and the government of Canada for wheat. Where there are already accepted standards, such as those of the Liverpool Cotton Exchange for raw cotton, it is, of course, very desirable that Government standards should correspond; and agreement has, in fact, been reached in this case.

Exchange contracts may be classified into two main divisions :

“ *Spot* ” contracts, wherein is contemplated on the part of both parties delivery, either immediate or deferred, of definite actual quantities of the commodity. This is effected usually by inspection of samples, or by description of standard grades where grading is carefully done.

“ *Futures* ” contracts, wherein one or both of the parties intend to settle otherwise than by the actual handling of the commodity which is the subject of the agreement.

The second class is of a speculative nature and is subsidiary, but complementary, to the first, which covers the straightforward transfer of actual lots from the producer, through the ordinary distributive channels, to the consumer.

The essential features of “ *futures* ” contracts are :

(a) That the grade of the commodity which is most abundant, or which is most commonly handled in the Exchange concerned, is specified: and delivery of that grade, or one very near to it in quality, alone constitutes a valid delivery. This is the "contract" or "standard" grade.

(b) There is always a rather large unit of amount prescribed, which can rarely be subdivided (for example, 100 bales of American cotton—about 48,000 lbs.—is the unit on the Liverpool Cotton Exchange).

(c) Delivery must be made either on a definite day or, in some cases, within a definite named delivery period starting from a certain day. Delivery cannot be made before the fixed date.

(d) Delivery is usually required *ex* certain warehouses or *ex* certain places. The object of this is to ensure correct grading, to help the exchange authorities to maintain their control over marketing methods, and to enable them to estimate accurately the quantities in sight or coming forward for sale within a brief period ahead.

When delivery may be tendered, by sellers of futures, on any day of the month named in the contract, such contracts are often called "Options." The option is as to date only.

Hedging is the name given to the operation whereby a contract for future delivery is settled, before maturity, by a subsequent contract or series of contracts which have the effect of cancelling the first, with the object of avoiding the risk of unexpected or incalculable price-fluctuations during a period of time when produce has to be carried by grower, merchant, or user. Its essential feature is the concluding of a futures contract side by side with a genuine trade contract, so that a loss due to price-fluctuation in the latter may be approximately balanced by a profit on the former.*

* The process may be illustrated by the procedure of a cotton importer who, through the Liverpool Cotton Exchange, enters into a trade contract with an American exporter to buy a certain quantity of American cotton at the current price, say, 5·40*d.* per lb. for delivery at a deferred date.

When the time arrives for the importer to take delivery of his cotton, the current market price may have fallen, say, to 5·20*d.* He stands to lose, therefore, 0·20*d.* per lb. on the re-sale of his purchase.

To guard against this risk, when he bought in the first instance, he sold at the same time cotton futures (*i.e.* he contracted nominally to supply cotton) to the same quantity, delivery date, and price, *viz.*

The operation of hedging, involving sometimes a great number of futures transactions while the commodity itself remains in the warehouse, is associated with the fact that at any given moment the futures contracts in existence will have reference to many times the actual amount of produce existent.

The chief service rendered by the speculator to the market is the possibility which his presence establishes of being able to find some member of an Exchange who is willing to buy or sell just the amount of futures required by the dealer who is engaged in hedging.

It is speculation, again, on the part of the experts which links up the Produce Exchanges in each commodity into what amounts to a single market for that commodity, and enables a general world price to be established. The means of achieving this is by what is known as an *arbitrage transaction*. The price of a commodity on one Exchange differs from its price on another, normally, by the cost of carriage and other charges incurred in transferring the commodity from the one Exchange to the other. If at any time the price difference is greater than this amount, a profit can be made by buying in the cheaper market and at the same time selling for future delivery in the dearer, arranging for the transport of the commodity from one place to the other as required to fulfil the contract. In practice, this is scarcely ever done. It is much simpler to buy futures in one market and sell futures in the other, "closing out" each contract in the market where it has been made.

Auction Sales.—Commodities that are not suitable for Produce Exchange trading, but may be concentrated at one point in sufficient quantities to attract an adequate number of buyers, are made the subject of regular auction sales at a Central Market. Tea, coffee and wool have long been the subject of auction sales. Other imported commodities are also dealt with in a similar way—for the most part in London.

5·40*d.* per lb. When the time comes to fulfil this contract, he arranges to "close-out," i.e. he satisfies his "futures" contract to supply, by buying an equivalent "futures" contract, by which someone else takes over the onus of supplying. But he does this at the time when he is due to take delivery of his cotton and when, therefore, short date futures contracts are being bought and sold at the price of 5·20*d.* per lb. He thus makes a profit of 0·20*d.* per lb. on his "futures" transaction. This corresponds in amount with his loss on the initial trade contract and he will thus, in effect, have obtained his cotton at the current market price ruling at the time he takes delivery.

CHAPTER VI

PRINCIPLES OF MANAGEMENT

"A high standard of management practice is essential not only over the whole field of British industry and commerce, but also in national and local government administration if this country is to attain and maintain the efficiency necessary for the full development of its resources for home and export trade. In recent years good management practice has become more and more essential to industrial and commercial efficiency ; it has also most certainly become more complex, and the duties of management will call in a very special degree for such qualities of leadership as can only be given by the best persons in the country fully supported by the pooled experience of all the specialists."

*From "A Central Institute of Management." A report to the President of the Board of Trade. (Published April, 1946.)*²¹

"If, as James Burnham would have us believe, we managers are to inherit the earth, to become the controlling class, it is our duty to do more than discuss and evolve improved techniques for greater efficiency, however necessary they may be. Our most essential task is to inaugurate a new sort of research whereby a band of new philosophers can, beyond some lost horizon, so transform economics and so activate the Christian faith that mankind may be led forward in true progress."

G. Ronald Pryor in discussion at an I.I.A. Conference on Management and Society, held in April 1944.

THIS chapter and the two following, taken together, constitute a brief review of the principles which are both those of general management and the general principles of management in their personal as distinct from their material application. General management is deeply concerned with the Human Factor and with Industrial Relations, which themselves are closely connected and interwoven, acting and reacting on each other. Consequently, while it is convenient to group certain activities

in different chapters, the student must realise that, notwithstanding this textual separation, these three main groups of activity are more homogeneous than those of the other functions of management already described.

Therefore, in order to assist him to give balance and larger purpose to the study of the sectional aspects of management, the future manager should apprehend early in his industrial career the existence and high importance of the principles considered in these three chapters.

In passing, it may be noted that there is at present no set rule for the appointment of general managers, nor does it appear that such rule is likely to be in general use for some time to come. At first sight it might seem probable that men with technological training and experience would be preferred for these positions, but in practice such appointments seem to be given more often to non-technical or so-called "commercial" men.

The change-over in industry from personal ownership to limited companies has led to the rapid development of administrative responsibility amongst Company Secretaries and Chief Accountants, so that they have increasingly arrived, through financial control, at general management.

Again, not infrequently men with selling experience are appointed as general managers, presumably on the ground that their ability to sell is sufficient to guarantee the success of the businesses entrusted to their guidance. Financial interest often exercises general control, not merely as a proprietary right but also because the nature and operation of the financial function are such that, always and under all conditions, inevitably it pervades every enterprise—large or small—and the whole structure of industry, of commerce, of all government on every scale, and of international trade.

It is to be remembered, however, that the general manager must deal with the complex problems of design, production, sales, finance, and personnel simultaneously. The non-technical manager gets over his technical difficulties by receiving, evaluating, and using technical advice from qualified subordinates. It is, however, by no means so easy for the technical man to do the same for sales and finance; as these are in the main more essentially problems of highly-trained judgment, and are not to be settled by reference to established practice or calculations.)

The defeatist might be led to claim that there are so many imponderables entering into fitness for management that preparation in advance cannot be conducted even to a limited extent on organised, and still less on universal, lines. Such an attitude is doubtless responsible for the view, widely held by leading men in industry, that success in management is exclusively due to personality, by which presumably they mean that managers, like poets, are "born, not made."

It might be argued with no less force that successful management is impossible without * experience. If this is so, then the resultant "personality" may be compounded as much of experience as of original gifts. To gain the necessary experience involves persuading the powers that be that the opportunity is deserved; and the question arises how to obtain that opportunity. In every profession, other than management, specific training is the only door to opportunity to practise.

The industrial psychologist is claiming that, by his tests, he can select those best suited for any particular occupation. Scholastic attainments provide another measuring-stick, but it does not seem necessary for present purposes to place special faith in any particular method of vocational selection.

Rather would it seem safer, in view of the lack of positive knowledge of any young man's future development, to require that those whose technological or other training is likely to bring them to some degree of management responsibility should demonstrate their interest in that objective by systematic and comprehensive study of the technique of management, and that at appropriate stages their eyes should be opened as well to its normal characteristics as to its specific problems.

With such a basis to build on, industrial experience will serve to stimulate the growth of judgment and business acumen, and whatever native personality may exist will begin to find expression. The young man who has prepared himself on these lines in anticipation of an opportunity to acquire actual management experience is more likely to be given his chance than his rival who is content merely to look the part. Having got his foot on the ladder of executive responsibility, his ordered knowledge can be supplemented according to an organised plan; and in the ultimate result he may be expected to become competent to undertake the higher management.

* See Vol. I, *Introduction*, p. xxvi.

This rigorous method of training will have schooled his personality into acceptable shape in a way that uninstructed opportunity, such as comes often to sons and nephews of those in high places, could never equal in effectiveness.

FIRST PRINCIPLES

To students and practitioners alike, principles in the abstract are likely to give rise to some difficulty in assimilation; their significance is likely to be ignored as being theoretical rather than practical. L. Urwick¹⁶ has, however, been able to formulate the principles of administration in terms that avoid abstruseness by being amplified to an exceptional degree. The amplification may seem at first glance to represent over-elaboration rather than simplification; yet, in point of fact, understanding has been facilitated by breaking down into a number of recognisable parts a philosophy which otherwise, by its apparent complexity, rather baffles intellectual analysis. Experience, of course, provides a working knowledge of much of what is involved, but the student is likely to find his outlook broadened by considering at leisure the following statement of principles by this author.

In the first place it is necessary to state the conditions under which, in the vast majority of instances, business activities are conducted. Without such a statement much confusion is possible. The question of the ultimate basis of economic activity is one which divides men and nations more deeply than almost any other single issue of the day. This division is expressed in such statements as the propositions that the object of business is to make money, business should be a service, and so on. But whatever the machinery for the ownership of the capital on which business depends for its resources, or the general attitude which motivates those taking part in business activities, the general conditions remain constant. The object of business activity considered broadly is the provision of the goods and services which the community requires; the test of the successful conduct of such activity is that the effort involved in the provision of such goods and services is commensurate with the effort which the community is prepared to put forward in order to enjoy them. Since the common measure of such effort is

money, it follows that business, whether conducted by the State, by individuals, or by some other form of organisation, must pay its way, that is to say, it must yield a return in terms of money commensurate with the amount invested in it, whether by way of the cost of the material and equipment involved, or by way of the remuneration of those participating.

The second broad condition is imposed by the technical advances in the means of production developed during the last hundred and fifty years. The economical production of goods and services is increasingly a question of the skilled arrangement and interrelation of machines and of the minutely subdivided human effort which machines have made possible. That is to say, economic production can only be carried out by the correlated effort of large numbers of individuals working in co-operation. Business is essentially a matter of the close co-ordination of individuals, not only for purposes of exchange, but in the production of any single article or service. The number of persons whose work must thus be combined, if the most economic use is to be made of the effort involved, tends on the whole progressively to increase.

These two conditions are absolute and irrespective of the form of economic ownership which any particular enterprise or country may choose to adopt. Subject to them, it is possible to lay down certain principles or guides to action which are valid in all cases, and which may be applied to the tasks of directing and controlling business activities. These are :

I. The Principles of Investigation, which include :

- (a) *The Principle of Determinism*—every business phenomenon is the result of definite and ascertainable causes.
- (b) *The Principle of Relation*—facts which are to form the basis of action must be in terms of the environment in which the action takes place. This involves
- (c) *The Principle of Analysis*—the scheme of classification must be appropriate to business activities.
- (d) *The Principle of Definition*—the facts must be stated in terms which accord with the underlying sciences on which business is based.

- (e) *The Principle of Measurement*—the facts must be stated in terms of definite units or standards.

II. The Principle of the Objective.—It is a necessary preliminary to all activity to have a complete and clear statement of the object of such activity in the form of a policy or of instructions. Action must be so arranged as to subordinate all secondary considerations to that object.

III. The Principles of Organisation.—Where a number of persons are to be associated in any enterprise it is necessary to observe definite principles of organisation and thus to establish a structure within which they may function. These are :

- (a) *The Principle of Functionalisation*—the necessary units of activity involved in the object of the enterprise should be analysed, subdivided, and arranged in logical groups in such a way as to secure by specialisation the greatest results from individual and combined effort.
- (b) *The Principle of Correspondence*—authority and responsibility must be coterminous, coequal and defined.
- (c) *The Principle of Initiative*—the form of the organisation should be such as to secure from each individual the maximum initiative of which he is capable.
- (d) *The Principle of Co-ordination*—the specialised conduct of activities necessitates arrangements for the systematic interrelating of those activities so as to secure economy of operation. Reference from one activity to another should always take the shortest possible line.
- (e) *The Principle of Continuity*—the structure of the organisation should be such as to provide not only for the activities immediately necessary to secure the object of the enterprise, but for the continuation of such activities for the full period of operation contemplated in the establishment of the enterprise. This involves a continuous supply of the necessary personnel and arrangements for the systematic improvement of every aspect of operation.

IV. The Principles of Direction.—When an organisation has been set up it is necessary to set it to work. This involves directing the activities of all concerned. The principles concerned are :

- (a) *The Principles of Publicity*—the principle of the objective must be applied to every individual and activity in the organisation however detailed, so that there is a clear understanding of the purpose of each task, and of the general relation of that purpose to the object of the enterprise, and to other tasks which come in contact with it.
- (b) *The Principle of the Incentive*—the persons required to operate the organisation must be so selected, trained, assigned to work, surrounded with a suitable environment, and instructed in the principles of co-operation that each develops his maximum personal effectiveness towards promoting the object of the enterprise.
- (c) *The Principle of Planning*—the principles of investigation and of the objective must be applied to the provision of all necessary equipment, material and human effort, and the calculation of the factors of time and space which determine their use *before* action is taken.
- (d) *The Principle of Simplification*—every unnecessary element should be eliminated both from the tasks called for and from the processes required to perform those tasks. Work should be done with the fewest unnecessary actions, and with the minimum of effort required to do the work well.
- (e) *The Principle of Standardisation*—whether in dealing with effort, materials, design, processes, or quality, the best current common practice should be expressed in terms of definite units or standards which should be applied wherever possible and to the greatest possible extent.
- (f) *The Principle of Balance*—each portion and function of the enterprise should operate with equal effectiveness in making its allotted contribution to the total purpose set before the enterprise as a whole.

- (g) *The Principle of Equity*—the task allotted to each individual in the enterprise must be such that he can without question perform it, and this fact must be demonstrable by those exercising authority.
- (h) *The Principle of Mobility*—the vitality of an enterprise is measured by its power of spontaneous reaction to changes in economic conditions, and of internal modification and rearrangement to meet such changes. This is true, both of the material and human factors, of methods of business organisation and of relations among classes, as well as of the personal skill, enterprise and leadership which individuals bring into the common stock. This power must be continually fostered and factors unfavourable to its development watched for and eliminated.

V. The Principles of Experiment.—If the principles of continuity and mobility are to be observed it is necessary to make arrangements for constant experiment with a view to improving features of the organisation or system. Such experiment should be governed by the following principles :

- (a) *The Principle of Selection*—the aspect of the organisation selected for improvement must be amenable to the means available, accessible to measurement and sufficiently limited to yield results both in achievement and in money within a reasonable period.
- (b) *The Principle of Controlled Factors*—the planned and defined procedure should be strictly followed even when it appears in the course of the work that another and alternative line of action would be more economical; such suggestions should form the subject of a later experiment. Not more than one factor of the problem should be varied at each experiment.
- (c) *The Principle of Decision*—instructions to subordinates relating to experiments should never refer to the tentative character of the arrangements proposed. Such arrangements should always be introduced as a definite part of the object of the enterprise.

VI. The Principles of Control.—In exercising control over the activities called for by direction in accordance with the structure of the organisation and the object set before the enterprise, the following principles should be observed :

- (a) *The Principle of Responsibility*—the responsibility of all persons exercising authority should be absolute within the defined terms of that authority. They should be personally accountable for all action taken by subordinates.
- (b) *The Principle of Evidence*—no statement concerning any person in the enterprise which implies comment or criticism should be accepted by any person in authority without full opportunity being offered to the person concerned to deal with the matter. The usual rules of evidence accepted for legal purposes should govern the acceptance of any statement. No adverse comment should become a matter of record unless the individual concerned has had an opportunity of considering the particulars.
- (c) *The Principle of Uniformity*—all figures and reports used for purposes of control must be in terms of the organisation structure. No person's effort should be expressed in any figures which he is not in a position to influence.
- (d) *The Principle of Comparison*—all figures and reports used for purposes of control should be in terms of standards of performance required and of past performance.
- (e) *The Principle of Utility*—figures and reports used for purposes of control vary in value directly in proportion to the period separating them from the events which they reflect. They should be designed with the object of assisting decision in the present and preventing waste in the future, while events are taking place, and not as a record.

—*Dictionary of Industrial Administration*.¹⁶

Subsequently these Principles were developed by L. Urwick⁷¹ in his book *The Elements of Administration*, where they were

placed in their relative settings and context. While this closely-reasoned book must be considered as an organic whole, it is perhaps appropriate here to summarise three of its most interesting Tables, each of which is set out as a logical square of nine items. The summary is that adopted in this author's *Lectures on Business Administration* ⁷⁰ as follows :

The Pattern of Administration.

<i>Sequence</i>	<i>Principle</i>	<i>Process</i>	<i>Effect</i>
ADMINISTRATION	Investigation	Forecasting	Planning
FORECASTING	Appropriateness	Organisation	Co-ordination
PLANNING	Order	Command	Control

Concerning this lay-out he says " These three principles, each with its corresponding process and effect, make up a logical square summarising the main aspects of administration. The underlying principle on which the whole art rests is *Investigation*. It enters into process with *Forecasting* and the effect is a Plan or *Planning*. Forecasting has its own principle, namely, *Appropriateness*. It enters into process with *Organisation*, since the first thing you do when you look ahead is to try to provide the means, human and material, to meet the future situation which you foresee. Its effect is *Co-ordination*. Finally, *Planning* finds its principle in *Order*, enters into process with *Command*, and the effect is *Control*."

In his *Lectures on Business Organisation* he explains further that " Forecasting, Planning, and Organisation are static aspects of Administration : they are intellectual processes which can be divorced from the Human Factor. Co-ordination, Command, and Control are dynamic aspects of Administration : they involve continuous consideration of individuals." As to Administration, he quotes from Fayol ¹⁷ : " Administration must not be confused with government. To govern is to conduct an undertaking towards its objective by seeking to make the best possible use of all the resources at its disposal ; it is, in fact, to ensure the smooth working of the six essential functions. Administration is only one of these functions " ; and he observes that " The general objective and broad policy of any undertaking are therefore ' given ' before administration starts."

The Pattern of Organisation and Co-ordination.

<i>Sequence</i>	<i>Principle</i>	<i>Process</i>	<i>Effect</i>
ORGANISATION AND CO- ORDINATION	Authority	The Scalar Process *	Assignment and Integration of Functions
THE SCALAR PROCESS	Leadership	Delegation	Functional Definition
ASSIGNMENT AND INTEGRATION OF FUNCTIONS	Determinative Functionalism (Legislative)	Applicative Functionalism (Executive)	Interpretative Functionalism (Judicial)

He comments that "the purpose of all organisation is to unify effort—that is, co-ordination," and quotes from Mooney and Reiley,⁵⁵ "This term expresses the principles of organisation *in toto*; nothing less. This does not mean that there are no subordinated principles; it simply means that all the others are contained in this one of co-ordination. The others are simply the principles through which co-ordination operates, and thus becomes effective."

The Pattern of Command and Control.

<i>Sequence</i>	<i>Principle</i>	<i>Process</i>	<i>Effect</i>
COMMAND AND CONTROL	Centralisation	Appropriate Staffing	Esprit de Corps
APPROPRIATE STAFFING	Selection and Placement	Rewards and Sanctions	Initiative
ESPRIT DE CORPS	Equity	Discipline	Stability

He comments that "The object of command and control is to secure the general interest and to see that it is not interfered with by individual interests," and quotes from Fayol,¹⁷ "see that individual interests do not interfere with this general interest."

Below are *Notes on Administration and Leadership*,† issued by L. Urwick⁷⁰ in connection with his Lectures on *Business Administration*.

* "There must be a process, formal in character, through which the co-ordinating authority operates from the top throughout the entire structure of the organised body. . . . This scalar process is the same form in organisation which is sometimes called hierarchical."—Mooney and Reiley.⁵⁵

† The *Pattern of Administration* and *The Pattern of Command and Control* which formed part of these Notes, have been given above and are omitted here.

With regard to these notes, *it is essential that the student observe most particularly that they are simply mnemonics to fix in the minds of those who heard the lectures their salient points. For full understanding of the applicability of the ideas involved, they must be considered in the light of the text from which they are extracted: they must not themselves be considered as constituting a text.*

1. Administration—Definition (Lecture 1).

Administration is those kinds of activity within the total process of government which involve forecasting, planning, organising, commanding, co-ordinating, and controlling the work of those concerned.

2. Levels of Authority and Responsibility (Lecture 1).

Criticism and Review.

Governing Authority.

Liaison between Policy and Operation.

Operating Authority.

Supervision of Operation.

Operation.

Jurisdiction.

3. The Principles of Planning (Lecture 2).

(a) An Objective.

(d) Standards.

(b) A Policy.

(e) Flexibility.

(c) Simplicity.

(f) Balance.

(g) Maximum Use of Available Resources.

4. Organization—Definition (Lecture 3).

Consists in dividing up all the activities necessary to any purpose and arranging them in groups which are assigned to individuals. Such a group of activities constitutes a **Position** or **Post**.

5. Ordinates (Lecture 3).

Such a Division must be in two senses. Activities are divided into different **kinds** (*i.e.* divided by vertical lines if shown graphically): they are also divided into different **levels** of authority and responsibility (*i.e.* divided by horizontal lines if shown graphically).

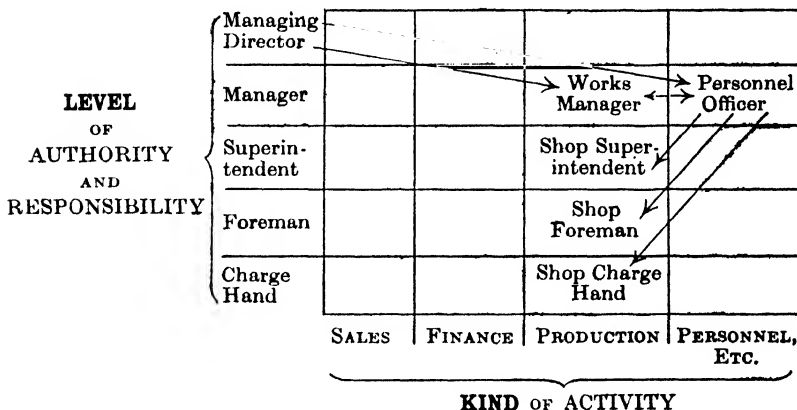
Authority is the formal right, conferred by the organization, to require action of others.

Responsibility is accountability for the performance of duties.

Authority and Responsibility must correspond. An individual who has authority without responsibility is "unaccountable": he has escaped from control. An individual who has responsibility without authority is being asked "to make bricks without straw."

6. Fixing Positions (Lecture 3).

It is impossible to define the content of a **Position** fully and accurately without placing it in relation to both ordinates, just as it is impossible to fix a point on a map or chart except in relation to both ordinates. Thus, as an example :—



The Works Manager is responsible for all activities concerned with Production. His level of authority is that of “manager” : he reports direct to the Managing Director. He is responsible for, and has authority over all officials at lower levels concerned with Production activities.

7. Co-ordination (Lecture 3).

The difficulty in all organization is to co-ordinate activities that is, to secure a proper distribution of authority and responsibility where two ordinates cross. For instance, in the above Chart, the Works Manager is responsible for all subordinate officers concerned with Production activities : but, the Personnel Officer is responsible for all activities concerned with the handling of personnel. How are their two authorities to be reconciled ? In addition to defining a **Position** in relation to both ordinates we have also to describe its co-ordinates, that is its relationship to other positions.

8. Relationships (Lecture 3).

Three typical relationships are found in all forms of organization :

(a) A subordinate has **general** responsibility to a superior and/or has **direct** authority over his subordinates for **all** the activities within a given unit of organization usually described as “Line” relations.

(b) A subordinate has responsibility to a superior and/or has **indirect** authority over subordinates for all the activities concerned with a **special subject** or subjects within a given unit of organization: his authority is indirect because it must be exercised through the “Line” superior concerned. These are usually known as “Functional” relations.

(c) A subordinate is “assistant to” a superior. He has no authority except in so far as he **represents** his superior's authority. He can therefore have no responsibility for the actions of subordinates other than those in a “Line” relation to himself. His responsibility is to give both his superior and his subordinates the best **advice** of which he is capable without attempting to direct their actions. These are usually known as “Staff” relations.

Thus :

RELATIONSHIPS IN ORGANIZATION

Relationship	Authority	Responsibility
“Line”	Direct	General
“Functional”	Indirect	Specialised
“Staff”	Representative	Advisory

9. Some Principles of Organization (Lecture 3).

- | | |
|--------------------------|---------------------------|
| (a) The Objective. | (d) Responsibility. |
| (b) Definition. | (e) Specialisation. |
| (c) Correspondence. | (f) The Scalar Principle. |
| (g) The Span of Control. | |

10. Some Methods of Organization (Lecture 3).

(a) Unitary, limits of responsibility fixed in relation to persons, things, numbers, or areas.

(b) Serial, limits of responsibility fixed in relation to processes or types of equipment.

(c) Functional, limits of responsibility fixed in relation to subjects.

11. Some Methods and Principles of Co-ordination (Lecture 4).**(a) Mechanisms :**

- (i) Co-ordinating Personnel.
- (ii) Committees and Conferences.
- (iii) Instructions.
- (iv) Reports and Returns.
- (v) Training.
- (vi) Doctrine.

(b) Psychological Principles :

- (i) Direct contact between those concerned.
- (ii) Co-ordination in the early stages.
- (iii) Reciprocal inter-relating of all the factors.
- (iv) Co-ordination as a continuous process.

12. The Functions of Leadership (Lecture 4).

- (a) Representation.
- (b) Initiation.
- (c) Administration.
- (d) Interpretation.

13. Leadership is NOT Domination (Lecture 4).**THE BOSS AND THE LEADER**

(With acknowledgements to "Callisthenes," *The Times*, March 18, 1937).

*The Boss**The Leader*

Drives his men.	Coaches them.
Depends on authority.	Depends on goodwill.
Inspires fear.	Inspires enthusiasm.
Says "I."	Says "We."
Says "Get there on time."	Gets there ahead of time.
Fixes the blame for the breakdown.	Fixes the breakdown.
Knows how it is done.	Shows how it is done.
Makes work a drudgery.	Makes it a game.
Says "Go."	Says "Let's go."

E. S. Byng⁵⁰ says of administration : " A definition of the word administration is necessary, partly because popular conceptions on the subject tend to be both vague and various, and partly because of the special use of the term " Administrative Class " in the Civil Service. The specification drawn up many years ago by the French industrialist, Henri Fayol, is now generally accepted ; it defined administration as being concerned with six functions—forecasting, planning,

organising, commanding, co-ordinating, and controlling. This definition not only confirms the view, already expressed, that administration is a factor in every kind of organised service, public, industrial, or commercial, but it also indicates that some element of administration enters into the work of all ranks engaged in such service. The proportion varies widely over the scale of responsibility, being extremely small in the non-

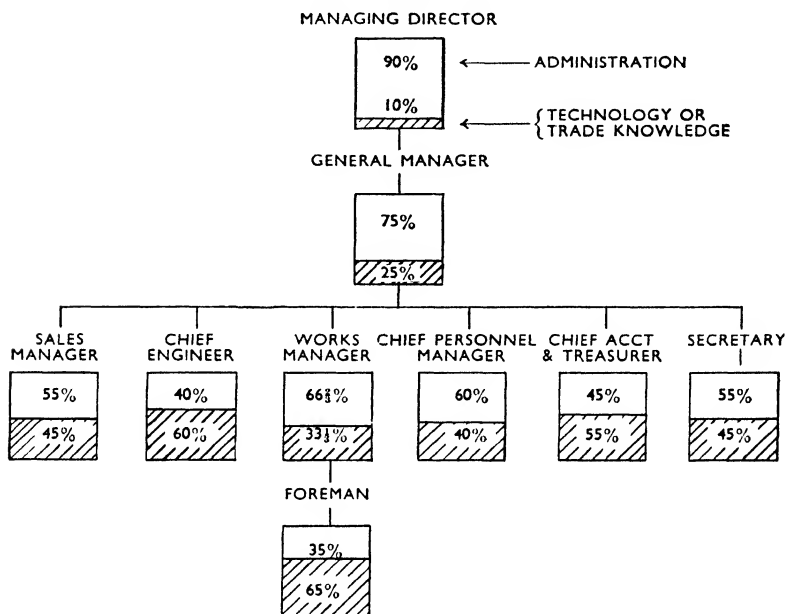


FIG. 6.—*Typical Ratios of "Administration" to "Technology."*

Reproduced by courtesy of the *Institute of Public Administration*.

executive ranks and rising to a maximum among the highest officers, some of whom may be engaged almost solely upon administrative duties.

The above diagram illustrates the ratios of administrative to technological activities, ranging from the managing director to the foreman, in an industrial undertaking. The proportions are, of course, only rough approximations, but they may be regarded as broadly typical of industrial concerns. A study of the diagram in the light of Fayol's definition will bring out the fact that in all the grades represented some element of the six functions of the administrator enters into the normal work."

*Post-Entry Training for Administration from the Industrial Aspect.*⁵⁰

Inherent in the ever-widening scope and increasing scale and tempo of contemporary industry, whether conducted by private enterprise or nationalised, is an urgent need for administration which is not only efficient in a material sense, but also is guided in the direction and conduct of industry by ideals and standards of knowledge founded on accurate research and refined by intellectual endeavour.

HIGHER MANAGEMENT

The responsibilities of the Board of Directors and of the Managing Director or the General Manager are well stated by Edward Brech³ in a thoughtful monograph from which are quoted the following comments and Tables :

The Board of Directors (See details in Table I).

The nature of the Board's responsibilities is more readily appreciated if it is remembered that in principle the Board is elected by the shareholders and entrusted by them with the "direction" of the Company's affairs. It has become customary now for shareholders to be primarily (and sometimes exclusively) interested in the financial progress of the enterprise. Thus it is that the chairman speaking at the Annual General Meetings devotes so much of his address to matters of financial accounting. Fashion decrees that in war-time he should pay tribute to the loyal and keen service of the staff. It would, however, be taken as an oddity if a Chairman spent most of his time in his speech to shareholders in dealing with the personnel problems or other specifically executive matters of the organisation. This responsibility to those who have contributed the capital of the Company largely determines the character of the Board's duties. (The Directors are what their title implies—the persons entrusted with the task of marking out the road to be followed and checking up periodically to see that the journey is being continued according to plan. Thus it is that a Board often feels itself able to discharge its duty adequately by a fortnightly or monthly meeting. Broadly, its task may be summarised as threefold—to determine policy and check up on progress towards its fulfilment; to ensure that the Company's legal obligations are carried out; to watch over the financial interests of the shareholders. But this is not necessarily so negative a responsibility as the bald statement would

make it appear. Under the first heading can fall a very considerable range of interests—everything in fact that affects the well-being of the concern and of the people working in it.) This, in fact, is indicated by the second item in the list set out in Table I, implying that the responsibility for the formulation of general policy also entails some responsibility for the breaking down of that policy into the working parts of the organisation.

Not infrequently a Board endeavours to mark its interest in these sectional or specialist groups of executive activities within the organisation by appointing certain of its members to be full-time officials of the Company “in charge of” this or that section. (There are, of course, occasions on which the title of “Works Director” or “Personnel Director” is assumed simply as a means of adding—or attempting to add—prestige to the person doing an ordinary executive job.) It is important to emphasise the clear distinction between the directorial and the executive function. As a member of the Board, a Director’s responsibility is concerned with the three major spheres just indicated. Strictly speaking, as a Director he has no individual function at all; he exists and acts only in his group capacity as part of the Board. If he happens also to hold an executive function in the organisation, this must be kept distinct from his Board status. Should he, for example, be in charge of manufacturing, then he is a “production manager” or “factory manager” by function—and ought to be so called, too. He operates in the organisation in a dual capacity, and the two parts are as distinct as Dr. Jekyll and Mr. Hyde. On the one hand, when sitting or acting as a member of the Board (a corporate activity, be it noted) he is exercising Director responsibility. On the other hand, when discharging his individual duties as executive in charge of manufacturing, he is exercising his Production Manager responsibility. As a Director he has and can have no executive responsibility (unless he is the Managing Director), and the use of the title “Production Director” does not endow him with any greater executive status or authority.

Failure to maintain this distinction is very frequently the cause of confusion, misunderstandings, and weaknesses in an organisation.

The Managing Director or General Manager (See details in Table II).

The list of duties undoubtedly appears formidable, and it

certainly serves to indicate the heavy responsibility attaching to the "chief executive." This informal designation is one that has become common in more recent years, and it is a very useful description of his true function. In the present context the terms "managing director" and "general manager" are used as precisely synonymous. A difference is sometimes made in so far as a "General Manager" may be appointed who is not elected to the Board; that is to say, he is not a Director, although he attends Board meetings. Moreover, in very large organisations both titles may be used, the General Manager being virtually an "assistant managing director" who carries out some of the executive duties of the Managing Director or who is limited to certain groups of activities. An interesting discussion could be conducted round the merits and drawbacks of an arrangement of this kind. Speaking generally, it may safely be said that the weaknesses and potential dangers outweigh by far the merits that it confers. This will become readily apparent when the nature of the management process has been critically studied.

For the purposes of this study, it is assumed that the "general manager" is, or virtually is, a "managing director" at least in the sense that he attends Board meetings as a matter of course, by virtue of his office. Fortunately, this is the customary practice. Therefore, the two titles will be used here indiscriminately and with precisely the same significance; or perhaps, by way of a change, the informal alternative "chief executive" will sometimes be adopted.

In examining the tasks of the Managing Director or General Manager, we are concerned with "top management" in the strictest sense, and with management in the least restricted sense. Other managers, as has already been noted, are by the nature of their posts and responsibilities restricted to certain sections or special aspects of the organisation. But the General Manager does not participate in this character. He may in certain instances undertake specific technical tasks for definite purposes, possibly connected with emergency problems or development proposals. Yet such tasks are *not* in any way *an essential part* of his responsibility; they do not belong to his "general management" function. It is unfortunately too frequent an occurrence for a Managing Director to be over-

concerned with some of the specialised activities of the enterprise. This may spring either from his own earlier bias or from lack of appreciation of his real task and a consequent failure to realise how much the organisation is losing in effectiveness by reason of the deficiency in real top management.

The General Manager's responsibilities appear to fall into four categories. Two are chiefly concerned with activities—duties of the “planning” and “control” type; that is to say, guiding the operations of the organisation and supervising their performance. The other two are more concerned with people, and one of them entirely so. The duty of “co-ordination” covers both people and their activities; that of “inspiration,” “motivation,” or “morale” concerns itself chiefly with the people.

The essence of management has never changed. Nor can it change. To Boulton & Watt equally as to F. W. Taylor a hundred years later, or to a contemporary industrial enterprise yet a further fifty years on, (the fundamental responsibility of management has been nought else but guiding and supervising the working team.) Perhaps the elaboration of procedures and methods has clouded the simple nucleus. Its obliteration has almost certainly contributed to the deterioration of management standards, because it has entailed neglect of the human basis on which management is, of its very nature, founded. In the course of recent years, events have served to throw into relief the significant human aspects of all work in industry, and the contribution of morale to the enhancement and maintenance of productivity has gradually been rediscovered. This development has been mainly concerned with the rank and file in the production sections of the economic system, but as a by-product it has led many managers to see also, in clearer relief, its pertinence to their own task. Management is a human process—you manage men and women, not things!

This is not in any way to decry the importance of sound and efficient methods of carrying these responsibilities into effect. The better such methods are, the more advanced the tools, the better the effect of the management can be. The two aspects are closely interwoven, and the character of the inter-relation between them is readily revealed by an analytical study of the process of management in operation.

Table I (Fig. 7). The Board of Directors—

is responsible to the shareholders (owners) of the Company for the direction and continuous control of the Company's affairs. As a Board it has no executive or managing functions; nor have its members, as such, any executive or managing functions. To ensure more effective conduct of its activities, the Board elects one of its members as its Chairman, to preside over meetings and speak as its official spokesman. But by this office the Chairman does not acquire any executive or managing functions. In accordance with Company Law, the Board has an official Secretary charged with responsibility for the preparation of agenda, minutes and other documents pertaining to the Board's activities, and for the carrying out of certain official formalities. But, the Secretary does not acquire by virtue of his office executive or managing functions in the organisation.

The Board's responsibilities may be summarised as follows :—

- (1) To formulate general policy for the conduct of the organisation on behalf of the shareholders, in accordance with the Company's natural social responsibilities to the community.
- (2) To lay down broad lines for the guidance of sectional policy (financial, production, marketing, personnel, research, public relations, etc.) in fulfilment of general policy.
- (3) To direct the Company's affairs in accordance with the Memorandum and Articles of Association.
- (4) To ensure that the Company's legal obligations are appropriately discharged.
- (5) To maintain a continuous control of the Company's affairs through the medium of periodic reports, accounts, and statistics submitted by the Chief Executive (= Managing Director or General Manager), in order to ensure that policy is being fulfilled.
- (6) To authorise capital expenditure and the disposition of profits or losses accruing in the conduct of the Company's affairs—included in this is the sanction of the purchase and sale of lands, buildings, or other assets, and the custody of the Company's property.

In discharging some of these responsibilities, notably items 2, 3, and 5, the Board will need to give special attention to three important activities of "top management" :

- (a) the creation and maintenance of a sound organisation structure, entailing smooth executive personnel relations and effective co-ordination.
- (b) the establishment of clear single "chief executive responsibility" in the person of a Managing Director or General Manager empowered to interpret policy into effective executive instructions for the fulfilment of which he is answerable to the Board.
- (c) ensuring continuity in the organisation by provision of training facilities for competent executive personnel right up to "top management" levels.

The Board may also think fit to give direct attention to certain other activities as a matter of special interest, such, for instance, as :—

- (d) the confirmation of senior executive appointments.
- (e) applications for or disposals of patents by the Company.

Table II (Fig. 8). The Managing Director or General Manager— (“the Chief Executive”) is responsible to the Board of Directors for the effective management of the organisation, in accordance with the policy laid down. Generally he is a full member of the Board and as such has a dual function—he is a Director and shares the responsibilities of the Board. But he is also the “chief manager” and thus has special additional responsibilities, not shared by any of the others (see text). These are executive or management responsibilities and may be summarised as follows :

- (1) Interpreting policy as laid down by the Board into instructions for executive action, *i.e.*, for carrying into effect by other executives and subordinates.
- (2) Issuing such instructions and ensuring that they are carried out, unless prevented by valid reasons.
- (3) Approval of sectional and detail plans for carrying into effect the official policy and instructions.
- (4) Giving decisions or rulings in cases where proposed plans or activities depart—for apparent good reason—from the approved policy or instructions.
- (5) Ensuring effective balance and co-ordination of activities and relations throughout the organisation, by the provision of appropriate facilities or mechanisms among executives immediately responsible to him, and securing the co-operation of such executives in the extension of co-ordination among their own subordinates.
- (6) Establishing and maintaining a sound organisation structure in good working order, with satisfactory definitions of responsibilities and duties and adequate means for ensuring smooth executive personnel relations. This is part of the general responsibility for co-ordination.
- (7) Promoting and maintaining a high level of morale throughout the organisation to ensure at all executive and supervisory levels the effective implementation of a sound personnel policy.
- (8) Appointment of (senior) executives down to a given level or approval of such appointments if entrusted to subordinates.
- (9) Providing suitable facilities for the functional training of executive and supervisory personnel, both to maintain existing competence and to ensure an adequate basis for promotion and succession.
- (10) Continuous control or supervision of the activities of the organisation, by means of meetings with and reports from executives, with a view to ensuring fulfilment of the plans or submission of reasons for departures.
- (11) Preparation of control reports and data for submission to Board of Directors.
- (12) Keeping subordinate executives continuously informed of

matters affecting the progress and well-being of the Company and their employment with it.

- (13) Receiving and faithfully (objectively) interpreting the views and comments of subordinate executives and members of the organisation to the Board of Directors.
- (14) Maintaining appropriate contact with Government Departments, Trade Associations and Federations, Trade Unions, and other such bodies bearing on the framing and fulfilment of policy and plans for the organisation. (This is a semi-executive activity conducted on behalf of the Board of Directors which may in part be delegated to specialist executives.)

In discharging these responsibilities, there are four aspects to which the Chief Executive will attach special significance:—

- (i) He carries the major responsibility for the overall effectiveness of management and operation throughout the organisation.
- (ii) Similarly, it is from him primarily that the "tone" of the organisation, that is, the ethical standards and spirit of personnel relations, will be determined. Admittedly, the policy decided by the Board ultimately determines standards in these directions, but the Chief Executive has the task of interpreting the policy and so of first setting the tone of the organisation in action. This may be seen, for instance, in the spirit in which joint consultative mechanisms are established and operated, as part of general personnel policy.
- (iii) The effectiveness of the Chief Executive's activities may be determined largely by the extent and manner in which he delegates his responsibilities. Not all can be delegated, but in regard to a number of them he can delegate a good deal of the tasks, while retaining ultimate responsibility and maintaining the personal contacts involved. Delegation is a highly important process in general management.
- (iv) Much of the Chief Executive's responsibility can be valuably carried into effect by suitably organised meetings or discussions with executives, especially in the larger organisations. He may also make use of Management Advisory Committees in respect of certain aspects of his tasks, particularly in periods of new development or re-planning.

The Chief Executive (Managing Director or General Manager) will usually have responsible to him a limited number of (senior) executives or managers, specialising in one or more groups or branches of the organisation's activities. Detailed arrangements will necessarily depend on the size and character of the enterprise.

Edward Brech.—*Management—Its Nature and Significance*.³

LEADERSHIP

Throughout his reading and thinking the student must bear in mind the distinction between leadership and management. The terms are not synonymous: leadership is mainly an emotional, and management mainly an intellectual, process. Use of the latter would seriously cramp the style of some

leaders ; and, however excellent plans may be in themselves, the manager who is also able to exercise some quality of leadership may get them accepted more willingly and quickly than if they were merely presented on their merits. A great deal has been written already on these subjects, but the half is not told. Here it is not suitable to do more than to glance at some of their phases, and by a few observations and book references to give the student notice of them, and to put him upon enquiry.

Certain terms have an erratic currency, sometimes circulating freely, and at other times being practically withdrawn from circulation. Such a word is leadership. To some it is a very *abracadabra*, mouthed in the parrot-like manner in which the egregious Shalford in H. G. Wells' *Kipps* uttered his foolish incantations : " Fishency, System, Ussel." To many a serious executive, however, leadership connotes the most dynamic power which, on the one hand, he may employ to assist him in attaining most effectively the beneficial objectives of a worthwhile undertaking ; but which, on the other hand, may be directed against him to nullify them.

Leadership is a key problem of industry, as of all human activities ; some say that it is *the* key problem : it is, moreover, a trust which, unfortunately, is often abused. The Gadarene swine had their leaders ; so, no doubt, have the lemmings. The evil effects of the applications of the *führer prinzip* and the *principio duce* were and are most painfully obvious. In this matter, as in others, nature abhors a vacuum ; and if men have no good leaders they will follow bad ones, who will not hesitate to pervert by skilful propaganda, false promises, and lying slogans, man's instinct to find and follow an ideal and to spend himself in its service. The age-old Challenge of Thor * is still intense and world-wide in all walks of life. A force so perennial and dynamic can neither be destroyed nor permanently suppressed ; the best hope for adolescent mankind lies in its salutary transmutation and sublimation, which would be powerfully aided by wise, informed, thoughtful, vigilant, and continuous administrative leadership and management.

It is a truism that the leader should transmit inspiration : the problem, however, is not only how he may do this, but (perhaps more difficult) how he may reach that rarefied atmosphere and dwell there. Whatever may be the solution, it is at

* See Longfellow, *The Saga of King Olaf*.

any rate the duty of a leader fully to fit himself to the best of his ability for the beneficial discharge of his onerous duty and great responsibility and, thus prepared, not merely to lead but to lead by the most approved methods and in the right direction, and so to set a high example and to deserve—perhaps attain—the achievement of government by consent of the governed.

(Professor A. N. Whitehead⁷³ remarks that “what is feared of senior management is not its lack of good intentions, but its *distance*.” At first sight this may appear to be a discouraging statement, but Edward Brech³ points out that “Management is essentially a human and social process, and primary among the factors that make it sound and effective are those that bear on co-ordination and morale”; and he asks “May we not say . . . that the attitude of men and women to their work is a reflection of the soundness of the management to which they are subject?” While it may not be possible in large undertakings of any kind for the leaders to be in personal contact with all who serve in them, it is nevertheless their privilege, their opportunity, and their most important function to transmit through well-chosen representatives such sound dynamic leadership that all who work in such undertakings approve the objectives, understand the importance of their contribution to them, and are actuated by the intention to make that contribution of real value.)

(A factor to be reckoned with in the effective transmission of leadership is that of the Span of Control, of which V. A. Graicunas³³ has written. Briefly, it postulates that no leader can supervise effectively the interactions and relationships of more than, at most, six immediate subordinates whose activities he must integrate and to whom he has delegated appropriate responsibilities.) Dissemination of leadership, therefore, may best be effected by successive delegation, as to competent and well-trained submanagers and supervisors; but though administration attains its greatest effectiveness by this means, comparatively few executives possess sufficient wisdom, perception, restraint, and unselfishness to enable them to delegate sufficiently, satisfactorily, and therefore successfully.

Another point is that the leadership content of the duties of managers tends to vary in direct proportion to the administrative content of the duties attaching to their positions. There is, too, a variation in kind from the comparatively rare type which, according to popular idea, must be distinguished by

some strong and picturesque trait arrestive of the imagination, to the fairly common type which is only distinguished by somewhat stronger character, or by slightly superior skill and knowledge, from those whom it falls to him to lead.

While the type of leadership appropriate to and expected of the managing director of a large undertaking may be mainly inspirational, that type will be less appropriate to his chiefs of staff, from whom will be expected leadership of a more companionable and associative nature. The type of leadership appropriate to and expected from their subordinates will approximate still more closely to the latter: partly it will be that of *Knowledge* in the old Moral Interlude, *Everyman*, and that attributed by Chaucer in the *Canterbury Tales Prologue* to his Poor Parson, and by Goldsmith in *The Deserted Village* to his Village Preacher; partly, too, it will derive from known and acknowledged skill and competence in the performance of the everyday tasks common to leader and led. There is no place in industry for the kind of leadership characteristic of "that celebrated, cultivated, under-rated nobleman, the Duke of Plaza-Toro"!

(Whatever the method by which industrial leadership may be disseminated, and its objectives interpreted and understood, it should incorporate the best features of the practice known as Multiple Management) to which reference is made at some length in the last section of Appendix C (see pp. 402-3).

THE ART OF MANAGEMENT

"The lyf so short, the craft so long to lerne,
Th'assay so hard, so sharp the conqueringe."

(The art of management, like the science, is far from being fully defined and is consequently the subject of apparently endless discussion. This is natural, for though the art is ancient and widespread, yet it is to a great extent personal, subjective, and elusive.) There is not yet—perhaps there never will be—one system so supreme that the manager neglects it at his peril. So highly individual an art will inevitably be coloured by the personality of its practitioner; so that one might almost say "As many managers, so many systems." On the other hand, it is unsound—even dangerous—to construct or warp a system to suit a personality: whatever system is inherited or devised, to give the best results it must incorporate all relevant sound principles. In the hands of an incom-

petent, ignorant executive even the best system may become a medium of disaster; but a wise and well-informed executive will know both how to adapt and improve a defective system, and how to make the best use of a good one.)

Though general principles of management are stated in this Chapter and on p. xxiv of the Introduction, and methods of departmental management are outlined in other Chapters, this book does not put forward any particular system of management. The reader, however, might find it a useful exercise to draft first a number of separate schemes of departmental management and then one or two of general management. In doing so he should give the necessary attention to the important questions of timing and proportion, and bear in mind that the most perfect scheme is ineffective unless operated on sound lines by the right personnel.

(A most important part of the art of management consists in skilful selection, appropriate training, and wise and tactful guidance and supervision of men who are to be the assistants of the established manager, and who with that background may in time be fitted to succeed him, or to seek full responsibility elsewhere.) Further consideration is given in the next section to the question of selection and training.

Many writers on the art of management fail to lay sufficient emphasis on the necessity for the consistent exercise of patience, tolerance, self-restraint, and self-control. Managers, of all grades from the chairman to the charge-hand, frequently find themselves so placed in relation to their superiors or subordinates in office that the best—sometimes the only—hope for the settlement of a difficult situation, or for the clarification of some misunderstanding, lies in such exercise. Though man-to-man arguments in industry are commonly conducted with good temper, and there are some splendid loyalties, it may unfortunately happen that superiors may be impatient, overbearing, capricious, interfering, or contemptuous of argument; subordinates may be cheeky, mulish, recalcitrant, or impervious to reason. Especially in regard to subordinates, the experienced manager will give credit for latent goodwill, not overlooking the possibility of forgetfulness, and making allowance for unskilful presentation of a case. He will not overlook, on the other hand, the possible existence of ill-will, but he will not conclude that it is present unless and until it has been made unmistak-

ably—perhaps painfully—clear. Then, while remembering that it may arise from physical or mental sickness, he will take whatever reasonable defensive or remedial action may be open to him, at the same time being careful to suppress any tendency he may feel to retaliation or revenge.

In any case the manager concerned, having made sure of his facts, must continue to present his point of view with all the tact and good humour at his command until it is admitted, or it is obviously most unwise to persist, or he has to acknowledge defeat. In either of the last two events he must take it with a good grace, and hope that his opponent will change his mind sooner or later; if he carries his point, he must be modest about it and try to soothe any ruffled feelings which his opponent may have. The manager, however, must never forget that he is not infallible, and that within the knowledge of his opponent there may be some aspect of the matter in dispute of which he himself is not aware and which he must try to elicit.

Sometimes the manager may find himself in a situation where he has to contend, not with a superior or subordinate in office—more or less a colleague—but with the representative of some organisation, or (still more difficult) with the endless arrogance of bumbledom, “drest in a little brief authority,” or with some outbreak of mass hysteria for which he is in no way responsible, and which may tempt him to feel that the Age of Confusion foretold by H. G. Wells is about to begin or has already arrived. Equally in such a situation his best hope lies in the exercise of patience, tolerance, self-restraint, and self-control, fortified by such knowledge, experience, and ability as he may possess. In all situations, however, there is a limit to the exhibition of these virtues; and, when this is reached, the employment of wisely-controlled impatience may have a salutary effect.

Another noticeable omission is that of mention of the danger to the manager of flattery and deception—favourite weapons of the sham and the fraud. Flattery is sometimes difficult to detect, and is often harder still to resist. Deception is also hard to detect: the discrepancy between what is said and what is intended may be anything between slight and total; but it will help the manager always to remember that what really matters is what the other party does rather than what he says, how he says it, and how he looks at the time—

“ My tablets ! Meet it is I write it down that one may smile, and smile, and be a villain.” The wise manager will never forget the existence of these dangers, and will develop the habit of testing mentally at the time what is said to him, sensing any *arrière pensée* and checking carefully as soon afterwards as he can everything of which he thinks there may be any doubt—see p. 400. Acquaintance with the rules of evidence and practice in the sifting of evidence will be of great value to him, and as his experience of men grows the danger to him of flattery and deception—except possibly self-deception—will recede. The widely-prevalent, almost unconscious habit of self-deception, with its attendant complacency and self-satisfaction, although doubtless a comfortable defence mechanism, is a serious deterrent to good management : “ Things are what they are, and their consequences will be what they will be ; why then, should we deceive ourselves ? ”

“ The proper study of mankind is man ” ; and in these matters, as in all others affecting human motives, desires, and actions, the manager may be powerfully aided by sound knowledge of individual and crowd or mass psychology, which he should make every effort to acquire. But he should remember that “ a little learning is a dangerous thing,” and that the science of psychology is far from being fully developed and codified. In so far as he invokes its aid, therefore, he should do so if not with prayer and fasting yet perhaps in fear and trembling ; for in the hands of some it is a treacherous tool, and many sad errors are unwittingly committed in its name.

Understanding of the actions and reactions of others may be facilitated if it is realised that Newton’s Laws of Motion not only define what happens when forces act upon matter but also that, properly considered, they help—especially the third law, which has been condensed into “ action and reaction are equal and opposite ”—to explain human conduct individually and collectively. From this point of view many things are clear which otherwise seem to be inexplicable. This, too, should assist the manager in his dealings with superiors and subordinates in office and with other persons and situations whom or which he may encounter, as should in addition the recollection of the Gaussian Law referred to on p. 363.

If eternal vigilance is the price of liberty, certainly it is one

of the many prices of good management. Point is given to this maxim in Kipling's homely verse :

" I keep six honest serving-men
(They taught me all I knew);
Their names are What and Why and When
And How and Where and Who."

(One of the marks of the efficient manager * is that he knows that satisfactory results do not just happen, but have to be worked for, and that to get them he must see that these "honest serving-men" bring him regular and reliable information obtained by diligent and energetic, yet discreet, investigation.)

Because the manager cannot live to himself alone, his personal conduct and way of life are matters of prime importance both to him and to those for the regulation of whose activities he is responsible. "As a man thinketh in his heart, so is he." How and what he so thinks will be largely governed by powerful predisposing factors of whose nature he may have little inkling, and over whose incidence and operation he has little chance of exercising control, until at least he comes to man's estate. Nevertheless, his personal conduct and way of life can be influenced to some extent by experience and knowledge gained at first- or second-hand and used intelligently, consistently, and with concentration. They may likewise be influenced by what he has read. Literature abounds in good advice : from so much of it as comes under his observation the reader will heed what appeals to him, and he will ignore the rest ; but he would do well to give most serious thought to and act upon the "few precepts" given by Polonius to Laertes in *Hamlet*, and in Kipling's *If*; and he would also do well to remember and consistently to follow the Golden Rule.

Bacon's Essay No. XI *Of Great Place* is good management reading, but much of its effect would be lost by brief quotation. In his Essay No. XXV *Of Despatch* he says, "Above all things, order and distribution, and singling out of parts, are the life of despatch : so as the distribution be not too subtle; for he that doth not divide will never enter well into business; and he that divideth too much will never come out of it clearly."

Oliver Sheldon,⁶⁵ has stated his views as follows :

"A profound knowledge of the ascertained and codified acts of management does not necessarily entail a capacity for

* Some very pertinent remarks by "Callisthenes" on *The Higher Efficiency* are quoted in Vol. I, p. 222.

management. Scientific knowledge is an essential preliminary to the practice of an art, but it is not the art itself.

“In practising the art of management, we are working upon a partially scientific and partially unscientific basis. The efforts of those who are furthering the cause of ‘Scientific Management’ are directed, therefore, to rendering that basis increasingly scientific, so that the exercise of management may be based upon a wider knowledge. The danger lies in the assumption that every extension of knowledge must circumscribe the art. Were the science of management as detailed as the science of medicine, there would still remain the necessity for the art of the manager as for the art of the doctor.

“Into every branch of industry the human factor enters, and where that factor exists, there must always remain a field outside the province of science.

“Science may elaborate, for instance, principles for the planning of work which are capable of universal application, but it must inevitably make the reservation that such principles are subject to the vagaries of the human factor. In other words, in so far as management deals with things, its methods can be reduced to terms of scientific principle; but in so far as it deals with men and women, it can only use scientific principles to the extent that the men and women are willing to subject themselves to them.”

The same author,⁶¹ writing in 1933, keeps the whole question in balance in the following terms :

“Industry needs in its managers not only knowledge of the technique of management, but also all those qualities which are normally summarised in the words personality and character. I think we should be making a vast mistake if we were to assume that purely intellectual attainments in the study and mastery of the technique of management were all that mattered. This certainly is the *new* factor in management, but the older factors of character, ability to win confidence, power of decision, enthusiasm, fine judgment, leadership, and a vivid sense of justice still count as much as, if not more than, ever they did.”

Dr. J. A. Bowie¹ reviews the position from another angle in the following words :

The manager is the inspirer of a team. It is his duty to cultivate those personal qualities and establish those business methods that will attract men of high calibre to his service. He should have the human touch, the ability to inspire confidence and to command respect by the evidence of quality in his business judgments. He must have an intellectual and moral respect for business as a career, he must cultivate the habit of objective-mindedness and of tolerance.

The test of a leader is not how good he is at "bossing," but how little "bossing" he has to do. There is, indeed, no word in the English language that expresses adequately the relationship between a modern administrator and his staff. "Employer" or "chief" are colourless words, "boss" is, or should be, an anachronism, while the word "leader," while useful as a corrective to the older idea, is in reality a misleading military analogy. The modern manager is not one who marches well in advance, beckoning his staff to follow. He is not a policy-maker or co-ordinator merely in the sense of tying together judgments, or interpreting facts, arrived at by independent units of his staff. The kind of management that must be increasingly developed in the large units of to-day is management according to function, with authority all along the line, in contrast to management by the fiat of a central power. The aim should be to collect a band of colleagues, not to institute an hierarchy of officials. The highest efficiency in modern business is not attained by establishing a long ladder of authority. The skill of the manager does not consist in making decisions for his subordinates, but in so training them that they tackle their own problems and make their own decisions. The modern manager does not compel, or even induce, others to follow his will, his main endeavour is to relate the separate wills in co-operative team-work. This does not mean that he receives the decisions of departmental or functional managers and then sets himself the task of harmonising them. It would be impossible to co-ordinate the *results* of the activities of the various sections. Co-ordination and co-operation should begin early in the organisation, which should be so planned and so motivated that strand interweaves with strand all along the line.

But if the chief administrator is not the only co-ordinator, he is the final and supreme one. His intelligence is the weft

which binds the many threads of group activities into a single fabric. It is his business to see the enterprise steadily and to see it whole. If his job were analysed it would be found that a large part of his work consisted in learning things from other people and in teaching other people the things he has learnt.)

*Education for Business Management.*¹

So much has been said of management as an economic instrument, that it is fitting to include a quotation dealing with some attributes of leadership which have no direct connection with the objective of profit-making. The rules for military leaders, attributed to Vice-Admiral William S. Sims of the United States Navy, serve to present the personal aspect of management from an angle likely to stimulate thought in industrial circles, even if they are little more than platitudes which many others must have expressed at one time or another.

“Always let your general mission be understood.

“Invite suggestions and consider them carefully.

“Hold conferences for this purpose.

“Make use of competition where practicable.

“Be sure you know thoroughly the subject of all your instructions.

“Train your men in initiative by ‘putting it up to them’ on all proper occasions.

“When you have inspired loyalty in all your men, more than half your troubles will be over.

“Maintain discipline with the minimum reference to higher authority.

“Always be considerate of inexperience.

“Be absolutely just in all your dealings with your men.

“Avoid harshness in manner or in methods.

“Never destroy or decrease a man’s self-respect by humiliating him before others.

“Do not let the state of your liver influence your attitude towards your men.

“Do not inflict severe reprimands for minor faults.

“Remember that the purpose of all forms of punishment is correction—correction of the offending individual and a warning to others similarly situated.

“Before you take any action, or adopt any line of conduct, consider carefully its effect upon the man’s loyalty, upon the

development of his character, and its effect upon the discipline of the organisation.

“Remember that every single one of your official acts exerts a certain influence one way or the other.

“Avoid hostile criticism of authority, or even facetious or thoughtless criticism that has no hostile intent.”

These necessarily restricted and discursive notes and references will serve their purpose if they whet the appetite of the serious student of management for more extended reading. At this stage he should not try to ransack the existing literature of the subject, but he may with advantage read in the following sequence :

Professor Erwin H. Schell ⁶³ on *The Technique of Executive Control*.

Dr. James A. Bowie ¹ on *Education for Business Management*.

Walter Puckey ⁵⁸ on *What is this Management ?*

Edward Brech ³ on *Management—Its Nature and Significance*.

L. Urwick ⁷¹ on *The Elements of Administration*.

This section may fittingly close with another wise saw from the Father of English Poetry :

“Werk wel thyself that other folk canst rede.”

QUALIFICATIONS, SELECTION, AND TRAINING FOR MANAGEMENT

Qualifications.

Qualifications are summarised as follows in the section on *Training for Management* * :

The essentials of progress towards efficient management are :

Personality	plus	Specialised Professional Training	plus	Specialised Executive Experience
Supplemented by				
Training in Principles and Technique of Industrial Administration.				

and are so fully discussed in *Notes for Students* (Vol. I, Appendix B), and in Appendix C to this Volume, that it is not necessary at this point to say more than that Personality, as stated in

* See Vol. I, *Introduction*.

the above-mentioned section on *Training for Management*, "is a highly significant factor in management, but training serves to direct and develop personality, and adds the constructive value derived from thought and study."

Selection.

Selection is discussed in Appendix C, especially in the last three sections, but it may be noted in passing that some Boards of Directors will not appoint a general manager who has not already held such a post.* Some form of personality rating is often employed in selecting a manager; the Gaussian Law (see p. 363) may be worth remembering in this connection; and there are other methods, including hospitality. The methods used in the selection of officers for the Services in the second world war served their purpose well, and could be employed with advantage in the selection of men who, with suitable education, training, and experience, would become good managers in industry.

The larger the industrial undertaking, and the wider the responsibility of each of its executives, the greater is the necessity for wise selection of his assistants. What is essential is a good team, each of whom possesses the knowledge and experience to enable him satisfactorily to perform his allotted functions and to qualify for higher responsibility. Lack of such a team will tend to keep any undertaking at or below the level of mediocrity, and is not redeemed by one or two star performers, whose brilliance would be dimmed in such a setting.

Wise selection is thus seen to be one of the major—and, satisfactorily carried out, it can be one of the most rewarding—responsibilities of any executive.

Training.

Training for management is a main theme of the last three sections of Appendix C. Some such practice as that called Multiple Management (see pp. 402–3) is useful in training as well as in selection. In connection with the position known as Assistant to the Managing Director it has been remarked that sometimes its occupant lacks systematic training of any sort, with unfortunate results both to himself and to the managing

* Cf. "Who's next to be decapited
Cannot cut off another's head
Until he's cut his own off."

W. S. Gilbert, *The Mikado*,

director whom he is endeavouring to serve; also, it has been said that too often a trainee is one who is not trained either before or after his entrance on the industrial scene.

Specialised executive training usually proceeds simultaneously with specialised executive education, as in accountancy or engineering; and these are the preliminaries to the management experience which is acquired by the specialist in the performance of the duties of executive head of a sub-department or department.

Hitherto, in the matter of the technique of industrial administration the cart has come before the horse, and the manager has had to undertake his distinctive duties without the benefit of specific instruction in them such as is now available.

Some of our large, firmly established and well-known industrial undertakings have long used sound private systems of trainee instruction, and have been well rewarded for thus casting their bread upon the waters. These excellent examples have had comparatively few followers, whether from want of facilities, lack of finance, or deficiency of enterprise. To-day, however, the managing director who intends his trainee or personal assistant to be anything but a transient and embarrassed (and embarrassing) phantom has effective educational aid at hand, in the Technical Institutions and elsewhere, as never before. For example, a method which can give good results in the case of a trainee who has had no previous industrial instruction or experience is to divide his time into successive periods of (say) three months, employed as follows :—

<i>Period 1</i>	<i>Period 2</i>	<i>Period 3</i>
<i>Study of—</i>		
the first selected functional subject.	the second selected functional subject.	the third selected functional subject.
<i>Practical work in—</i>		
—	the first selected functional subject.	the second selected functional subject.

and so on, moving him through the departments until he has obtained in that way a sound theoretical and practical all-round introduction to management and can begin to specialise.

The saying that a problem stated is a problem solved suggests that management education should include sound instruction in the principles of analysis and synthesis; so that when the manager encounters some unusual, intractable, or

specially intricate problem to which he must find the right solution, he will know how best to resolve it into its apparent constituent parts, introduce any important factors which may be missing, and restate it on lines which will lead to that solution.

Having thus correctly stated the problem, to obtain the desired result the manager must then deal with it as far as

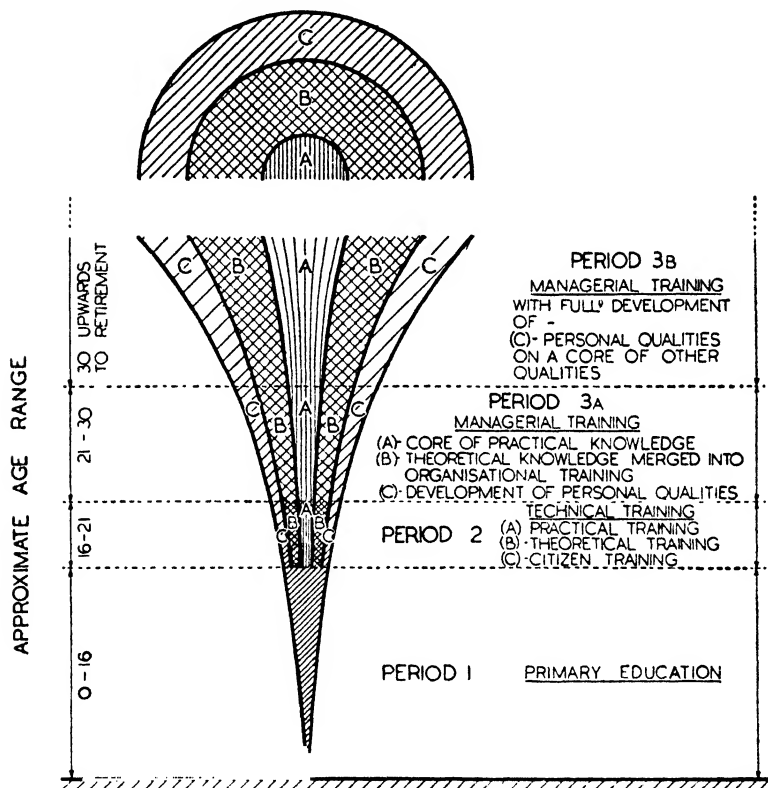


FIG. 9.—The Development of a Manager.

Reproduced by courtesy of Messrs. Chapman & Hall Ltd.

may be necessary in accordance with "the law of the situation," suppressing all desire to indulge his personal preferences and foibles where these are in conflict with that law. In any case, such indulgence is death to good management.

Steps by which the future general manager may acquire his training are well illustrated by Walter Puckey⁵⁸ in a striking diagram (Fig. 9).

PERSONAL QUALITIES OF THE MANAGER

Personality, to the onlooker, is first the outward and visible expression of the sum total of the physical, mental, moral, and spiritual characteristics of the individual. The impression received and formed by the onlooker may be far from accurate, but it does much to determine his attitude and reactions to the individual. In *Notes for Students* * it is remarked that :

The Student's development of his knowledge and experience of the subjects covered by the syllabus should be accompanied by a parallel development of his own personality and character. Personal qualities are outside the scope of examination. They are, however, of vital importance. Every student should give close attention to this aspect of his education, and, by learning how "to see himself as others see him," endeavour to equip himself with character as well as knowledge.

Until recently, this might have appeared to be an impossible feat. Now, however, with the aid of such experimental devices as the Psychodrama,⁶⁸ and of such essays on self-analysis as that of Lowenstein and Gerhardi,⁵³ some tentative approach may be made to its accomplishment; but any approach to this introspective stocktaking should be undertaken with circumspection, and every allowance should be made for the possibility—even the likelihood—of error.

It has been said on high authority that no man by taking thought can add one cubit to his stature. Physically, this is still true, but there is some possibility of growth of character. The method adopted by Mr. Nicodemus Easy to develop and improve his mental and moral qualities and powers had a most regrettable result, and is not recommended. There is, however, a better way.

“ We cannot kindle when we will
The fire that in the heart resides ;
The spirit moveth and is still,
In mystery the heart abides.
But tasks in hours of insight will'd
Can be in hours of gloom fulfill'd.”

In the conduct of everyday affairs it is not essential, and may prove hopeless, to wait upon hours of insight. When they occur they enter into process with flashes of inspiration, and take effect in great discoveries or momentous actions. What is needed for normal progress is some perhaps duller but

* Vol. I, Appendix B.

definite and dependable technique, such as that which is founded on the fact that the spotlight of inquisitiveness, in the sense of curiosity and cursory investigation, can be directed at will. When so directed, what it discovers may awaken interest, and consequently stimulate desire for knowledge. This, in turn, may induce constructive thought, leading to purposeful action; repeated action tends to the formation of habit; and the last link in the chain is that habit conduces to the inception and development of an ingredient of character. Thus, by deliberate choice of the direction in which interest shall be projected, and by subsequent appropriate action, a man may do something to form and improve his character; but he should not be too ambitious in this direction, or too disappointed with his positive or negative results, bearing in mind the limitations implied in Kipling's poem *The Sons of Martha*.

At some stage of his development, the aspirant to management may notice that in the most exacting of his undertakings—educational or otherwise—sooner or later he arrives at some point of difficulty, and that he is disinclined to make the effort necessary to overcome it, even if he believes it to be within his power to do so. That point is for him a crux of character. If he faces the difficulty squarely and makes a persistent and determined effort to overcome it, either he will succeed in doing so or he will realise his limitations in that direction; and he will be of the stuff of which managers are made. If he refuses the first fence of this kind, he will have taken the first step to the formation of a bad habit; and if he continues to refuse such fences, he is unworthy to be a manager and should not adopt, and would be unlikely to succeed in, the profession of management.

Prosperity tends to soften the moral fibre, especially of him to whom it comes unexpectedly and who lacks the modifying and fortifying influences of education and training—"There is no tyrant like the slave set free." Within limits, adversity tends to have the opposite effect. Power is one of the attributes of prosperity; and it has been said with truth that "Power tends to corrupt, and absolute power tends to corrupt absolutely." Fortunately, this effect is not inevitable; for if the man to whom in the normal course of events power is entrusted, or if he upon whom it is suddenly thrust, realises the danger stated in the aphorism, understands the nature and value of the corrective residing in the acquisition of appropriate

education and training, and has the strength of character to obtain and apply it, he may successfully resist the corrupting influence of power.

Personal qualities are discussed throughout Appendix C, and Dr. C. H. Northcott ⁵⁶ has made a valuable contribution to the effective statement of qualities of character and personality. Among the many excellent personal qualities which the manager should strive to possess and cultivate, high place must be given to the modesty, cheerfulness, and love of his fellow men exhibited by Abou Ben Adhem, and to that wide, magnanimous manifestation of charity of which St. Paul wrote so eloquently.

In the endeavour to improve innate qualities, valuable habits to form are those of reading great literature of all kinds, listening to great music, and cultivating appreciation of drama, of the visual arts, and of scenes of natural beauty. The practice of an art or handicraft as a hobby may be both a pleasure and a useful aid to self-discipline.

A most helpful book by Professor Erwin H. Schell ⁶³ on personal qualities good and bad in their incidence and effect in industry has already been mentioned. A work of the mid-Victorian period, written for the advice and encouragement of aspirants in general, is Smiles' *Self Help* which, though not great literature, was once a prime favourite and still deserves more attention than it gets; but there is sore need for a better book covering this wide and inadequately cultivated field.

Two good sayings to remember and act upon are *Mens sana in corpore sano* and *Manners makyth man*; and an encouraging message to take to heart is that in the conclusion of Longfellow's *The Wind Over the Chimney*.

DIVISION OF FUNCTIONS

Though all the functions of management have to be exercised in even the smallest industrial concern as well as in the largest, obviously in the former they must all be performed by one person. Physical division of labour and of functions are introduced at appropriate stages in the growth of the business. This is aptly illustrated in a thumbnail sketch by J. F. Burns Morton,⁴⁵ who says :

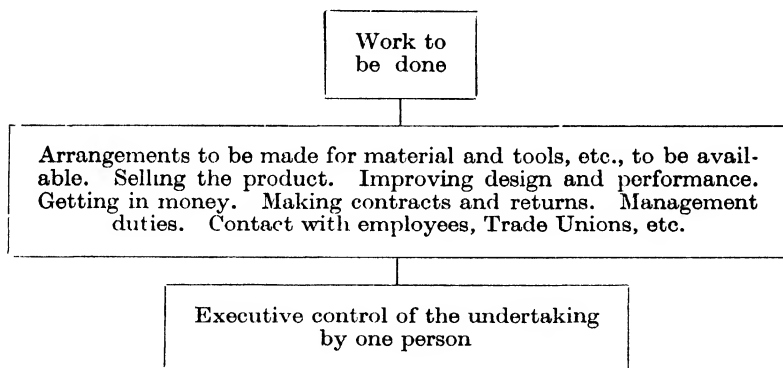
The purpose of the highly involved organisation in a large factory can be most clearly understood by considering the

growth of a typical company. Suppose that an engineer designs a special tool which he decides to manufacture himself. After making the first few models he finds a demand for more than he can produce by himself. So he rents a workshop and engages workmen. The engineer himself at this stage has to do all the supervision work, unaided even by a foreman, and in addition he buys the raw materials, supervises manufacture, pays wages, and despatches finished products.

He is thus discharging, unaided, the following primary functions of management :

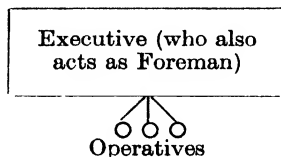
(a) Production, (b) Distribution, (c) Development, (d) Accounts and Finance, (e) Legal and Secretarial, (f) Direction and General Management, including Personnel Administration and Industrial Relations.

Supervision can now be illustrated in its simplest form :



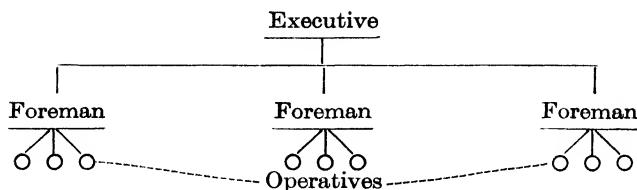
This is simple organisation of the Straight-Line Type.

The next step is



which gives the first illustration of the functions of a foreman.

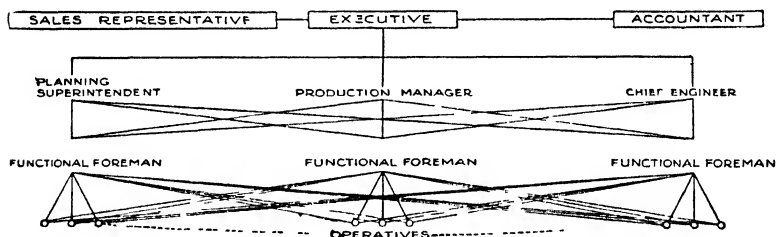
If the product involves assembly of several sets of components, then this simple line of authority is expanded to suit the needs :



Modern development has obviously outgrown this type of organisation, even in the small firm.

Now, at this stage, he either finds an increasing demand for his product or is offered other work to do. In either case, he cannot do everything himself. He must engage a sales representative to obtain orders for his growing output. He also engages office staff to keep records of wages and costs and to deal with correspondence.

This division of labour introduces modifications in management. This is based on the idea that the main divisions of the business should be made from a scientific analysis of the work, and similar functions grouped together. It separates organisation and planning from performance.



The engineer who founded the firm may now devote himself primarily to design, to the purchasing of materials and to engaging labour. Further extension brings with it many problems of new buildings, the need for more capital, increased selling activities, and so on. The engineer now assumes the function of manager and devotes his time to directing and co-ordinating the work of his subordinates. At this stage the private firm is turned into a company and the engineer becomes Managing Director, and devotes himself chiefly to policy. A manager is engaged to control the greatly enlarged works. Under the manager are : first, the specialists who control purchasing, labour, planning, time study, and design ; and secondly,

through the Works Manager, the departmental foremen. Similarly, the original sales representative becomes Sales Manager and has subordinates who are area representatives.

The organisation of the undertaking may now be illustrated in Fig. 11, p. 210.

Further growth is still possible. Two main lines of expansion exist. First, the control of smaller firms able to supply the necessary raw materials, or part-finished stores, such as pattern-making and foundry, might be purchased. This is called vertical integration.* Secondly, competitors making similar products might combine for the sake of economy. This is known as horizontal combination.† In both these cases the original workshop has been extended not only into a large factory, but into a group of factories, possibly making a wide variety of products.

F. J. Burns Morton in *Introduction to Foremanship*.⁴⁵

The differing conditions of each business tend to create a corresponding variation in the allocation of functional responsibilities. Moreover, success is attained under so many different arrangements that it is not yet reasonable to contend that there is but one best way. Functions, or functional elements, must therefore be grouped in a way that is broad enough to constitute roughly a common denominator for all businesses. This can be done fairly simply, as follows :

Non-Executive Functions, viz. :

Those of the Board of Directors (see *Higher Management*, pp. 179-83).

Executive Functions, viz. :

General Management (see *Higher Management*, pp. 180-85).

Foremanship and Supervision (see pp. 211-15).

Personnel Management (Industrial Relations, Education, Training, and Welfare Services).

Development (Research and Design Services).

Production (Processing and Allied Services).

Distribution (Selling and Allied Services).

Finance (Accounting, Costing, and Allied Services).

Secretarial (Legal, Office, and Allied Services).

Of these, General Management, Production, and Distribution

* See Vol. I, p. 74.

† See Vol. I, p. 75.

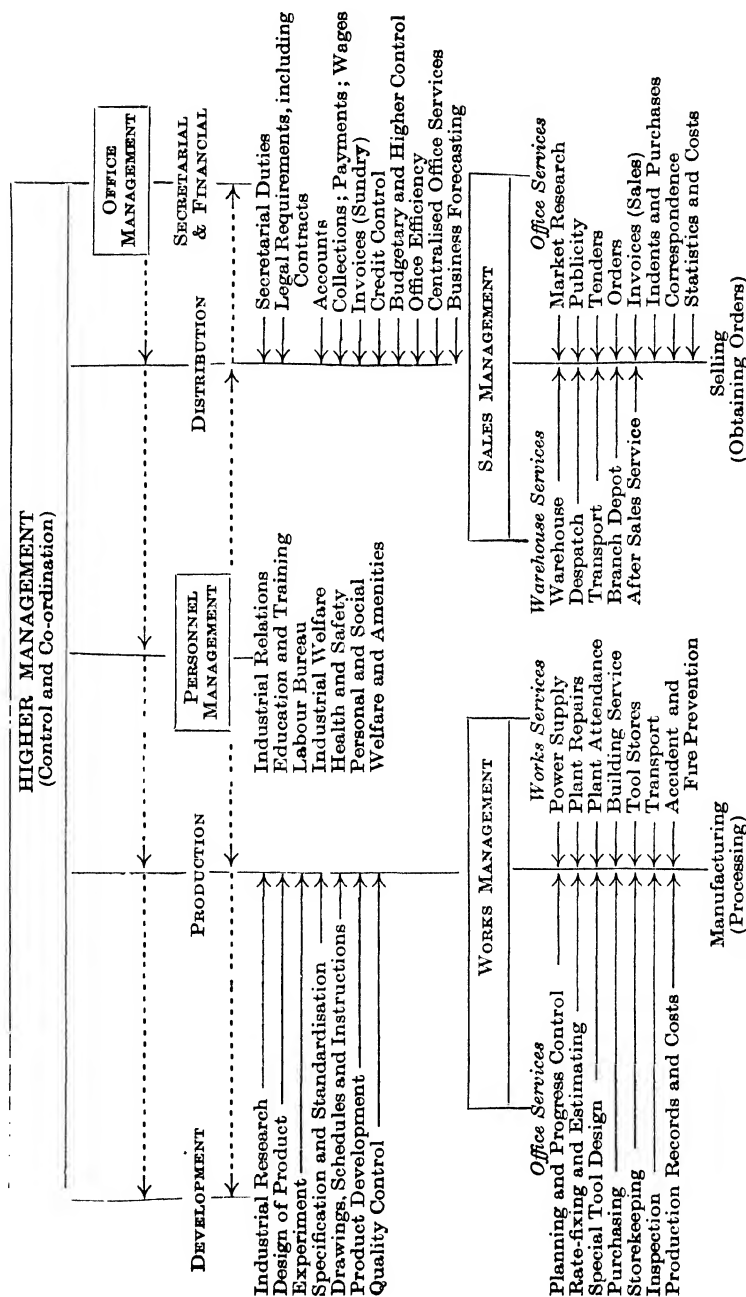


Fig. 10.—Diagram of Functional Organisation (to be read in conjunction with Fig. 11 on p. 210).

NOTE that the Personnel Management Function and the Office Management Function affect all others, as indicated by heavy horizontal dotted lines, but that the remaining functions are comparatively self-contained.

are major direct functions and the remainder are major secondary functions.

Opinions differ as to the number of distinct major functions, whether direct or secondary, but the classification above is informative to the student and has good authority.

Under these headings can be grouped the direct functional elements of processing and selling and the many secondary functional elements, as shown in detail later. The distinction implied above between major functions and functional elements is one of degree, and alternative terms would be group and single functions. The idea of functional elements is, however, to be preferred, because under different schemes of organisation the elements will be variously combined; and by referring to the elements as being distinguishable one from another, the student is not required to assume any particular combination or arrangement of departmental responsibility as being even typical.

The major functions set out above can with confidence be taken as being fundamentally and universally distinct in themselves, by whomsoever they may be exercised. Perhaps the only direction in which current practice lags behind theory is the failure to recognise Development as a necessary function. In some instances, however, particularly in very large industrial undertakings, in department stores, multiple shops, co-operative associations and the like, purchasing is obviously a major function.

The functional elements, both direct and secondary, that are involved in the foregoing major functions are set out in the Functional Organisation Diagram on p. 206. It is not necessary to claim that the list is exhaustive, or that no further breaking down is necessary to meet the requirements of particular industries or businesses. It is, however, comprehensive enough to enable the student to grasp the principles at stake. He must perforce be content to wait until later to learn by experience the many ramifications and alternatives found in practice.

The form chosen for the diagram serves incidentally to illustrate the combination of line organisation and functional organisation known as *Line and Staff organisation*.

Line organisation is applied to a "vertical" line organisation, where one rank is clearly below another to which it is directly related. The usual illustration is that of the army with its generals, colonels, and successive ranks down to the rank and file; but, under modern conditions, this line organisation must be served by "horizontal" functional organisation in

the form of medical service, engineering corps, etc., not under the main line organisation of the fighting units, but each with its own line organisation. In a sense every functional element must be controlled by a line organisation, for otherwise responsibilities would be divided, with results fatal to efficiency.

Functional organisation is doubtless as old as line organisation, but it probably owes its latter-day prominence in management literature to the development by F. W. Taylor, of scientific management fame, of the idea inside the workshop, where line organisation had previously prevailed. Instead of one foreman exercising many functions, Taylor split up the foreman's duties into what may be called functional elements, and put each in charge of a specialist with a title such as speed boss (speed of machines), gang boss (moving of material), etc. This conception, even in the Taylor application, is hardly exclusively of U.S.A. origin, for F. W. Brackenbury at Elswick introduced "feed and speed" men as far back as 1894 to see that machines were being operated rightly in these respects. The necessity for doing this arose out of the use of high-speed steel, and the consequent radical change of workshop habits. With the subsequent introduction of premium systems of payment-by-results, the feed and speed men became rate-fixers; and, in more developed organisations, rate-fixing has tended to grow into what is now known as planning. Rowan of Glasgow inaugurated a rate-fixing department when he introduced his premium system in 1897—soon after the strike in the Engineering Trade.

In this way, there are being gradually abstracted from the old-time foreman's range of duties certain functional elements that experience shows can be exercised better by specialists. To this extent, therefore, the line organisation of foreman and worker, that may appear to be still intact, is being subjected to functional organisation and its characteristics modified accordingly. Without being limited by this example, it is difficult to imagine any line organisation existing without some measure of functional organisation, just as functional organisation can hardly operate without its own line organisation. Because intermixing of the two types of organisation cannot be avoided, it has seemed better to differentiate the functional elements into direct and secondary, and to avoid further argument as between line and functional organisation in the more academic sense.

The diagram under discussion shows the secondary functional

elements as having a horizontal and auxiliary relation to the direct functional elements (processing and selling), shown as acting vertically. Vertical lines are also used to indicate the lines of executive responsibility.

Although not shown on this diagram, the Higher Management may derive marked assistance in the work of co-ordination by means of *Staff conferences*. It is very desirable that the term "committee" should be avoided in this connection, because this is apt to imply and lead to a dilution of control that may be disastrous. The Higher Management should officiate in the person of one or other of its members as chairman of every conference and be alone responsible for decisions. Alternatively a conference without such a chairman should only submit recommendations to the Higher Management, and would make no pretence to reach decisions, except possibly within approved limits that do not cut seriously across any direct line of personal responsibility.

Departmental Organisation.—It now remains to express the foregoing functional requirements in terms of departments, though, for the reasons stated earlier, there are difficulties in the way. Not only do the relative value and nature of functional elements vary in different businesses, but equally so does the capacity of department heads, not to mention the restrictive effect, in many cases, of tradition or vested interests.

In the formation of departments and sub-departments the natural tendency is toward concentration of functional activities. Where the size of the business warrants it, effective grouping of this type conduces to economy of effort, smoothness of working, and improvement of the product. It does not imply exclusiveness for, as Professor A. N. Whitehead⁷³ remarks, "It is a well-known fact amongst industrialists that the lines of authority in an organisation are mainly vertical, from the worker to the president, but the lines of collaboration tend to run horizontally between officials of approximately equal rank. This second line of collaboration has usually no recognition in the formal set-up of the company; it is an unofficial activity held in check by the formal organisation built on more or less vertical lines."

The Departmental Organisation Diagram on p. 210 is therefore to be read as a possible arrangement rather than, in any given circumstances, a probable one. Just as the proof of a pudding is in the eating, so the proof of any departmental

LINE AND STAFF ORGANISATION

The Staff idea recognises the need for specialists who study various phases, but line indicates that authority flows from top to bottom. Little offshoots of authority in staff departments where skilled specialists are in absolute control.

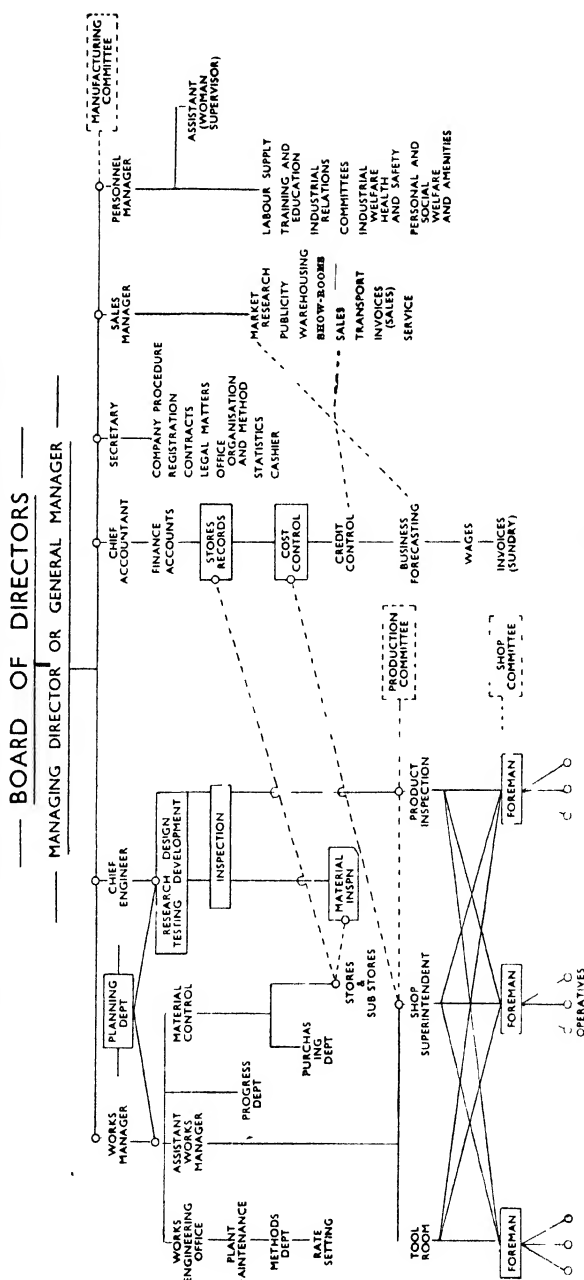


Fig. 11 (to be read in conjunction with Fig. 10 on p. 206).

The complexity of the business is clarified through a chart such as this, which may be regarded as a general assembly of all the main functions and personnel and as showing also sub-assemblies of auxiliary functions and their personnel. It should be noted that while the general layout of organisation charts proceeds on fairly standard lines, the details of each chart have to be planned to meet the needs of the business for which it is designed, and must be adjusted from time to time to take account of current modifications in the plan to meet new needs.

organisation is in the working. None the less, the student can usefully be given a clear indication of the usual departmentalisation, including in that term the managers to whom the various departments are likely to be responsible. No attempt is made to identify the functional elements with departments, except so far as the name of the departments may happen to correspond. There is no pretence to provide for every separable function; correspondence, for instance, is not specifically mentioned, since it is common to many departments.

No attempt has been made to particularise the qualifications necessary for the holder of each of the positions to which reference has been made. To do so would be to assume that in every business individuals holding similar positions must bear a common degree and extent of responsibilities, disregarding the varying technical considerations in different industries. The qualification fitting any individual for a given position must always be his or her competence to carry out the duties of the position in effective co-operation with all others within the organisation. It is hoped that, from a study of this book as a whole, the student will have visualised the character of the functions that may attach to any administrative position, and will, therefore, be able to form a clear enough idea of the personal qualifications likely to be necessary to carry any given set of responsibilities. As for the technical qualifications, in all probability the possession of these by the holder of any such position would be indicated by professional membership of one or more of the numerous sectional Institutions. The word "technical," it may be remarked, is used in respect of the technique of any profession and not as synonymous with technology, with its more specialised meaning.

As, with the exception of Foremanship and Supervision, the functions listed on p. 205 are dealt with in detail elsewhere in this book, it is unnecessary to summarise their main characteristics in this section. For the information of the student, however, some account—even though brief and inadequate—is given at this point of the important function of

Foremanship and Supervision.

"The keynotes of the modern foreman's duties are leadership and co-operation; and adequate knowledge of the principles underlying the work of other departments will enable him to

fulfil his duties with due appreciation of their respective values in the general scheme of production.

Administrative efficiency demands in each works department the co-ordination and integration of many specialised functions such as planning, progressing, rate-fixing, and costing. The importance of the charge hand, the foreman, and the supervisor increases with this demand; and there is everywhere a progressive recognition of the full potentialities of their positions, and of the necessity for adequate training to assist them intelligently and effectively to meet their growing responsibilities.

It has always been required of them that they should be expert craftsmen, of stable character, and able to lead men. Although these early requirements are still fundamental, the increasing transfer of skill to machines, coupled with an all-round advance in general education on the one hand, and in process and administrative efficiency on the other, have set up significant new considerations.

Those who wish to place themselves in the line for promotion must understand the changes in works organisation, and keep abreast of the modern planned methods of production which are now essential to efficiency and economy in manufacture.

It is obvious that without a working knowledge of control from the management's point of view, the charge hand, the foreman, and the supervisor cannot deal promptly and satisfactorily with the many divergent questions which arise in the course of their departmental work.

The positions occupied by them in the chain of administrative responsibility should entitle them to full recognition by, and the moral support of, the higher management. To justify this, however, there must be added to the craftsmanship and the personal characteristics which brought them to their positions, an understanding of the principles of industrial administration in the same sense as that necessary for the higher management, though to a lesser degree and in a narrower field."

*From Institute of Industrial Administration leaflet on
A Certificate Course in Foremanship and Works Supervision.*

The foreman's industrial responsibilities are obvious. He is surrounded by four chief interests. Firstly, he must carry out in detail the general policies and instructions issued by the management; secondly, he must help to ensure complete customer satisfaction by maintaining the quality of work-

manship expected, and by honouring delivery promises; thirdly (subject to the limitations already mentioned) he must enlist, promote, train, and retain competent and contented employees; and fourthly, as far as his limited responsibility extends, he must help to ensure the permanent prosperity of his firm by full consideration of the interests of the shareholders.

It is only by preserving the interests of these four main groups that an industrial concern can be well organised and can continue to exist and progress. The interests of the community as a whole are best served when the management, operatives, customers, and shareholders are reasonably satisfied. The foreman's central position is obvious.

The duties of the foreman also are administrative. He is an important link in the chain of administration. The higher management depend on him for the proper conduct of some of the most important work of the undertaking—that is to say, at the point of application of the principles of production organisation and planning to the work to be done on the factory floor in turning out the products which have to be marketed by the selling side of the organisation in order that it may be kept going.

His importance to industry is being widely recognised. Competent general management, improved planning, wage incentives, better working conditions, and so forth are only partially effective unless the foreman can make the best use of them. If the foreman doesn't know how to use the new tools which have been given him, if he takes unkindly to progressive ideas, if he cannot move with the times, then he will be a failure as a foreman to-day.

It is clear that the exact nature of the foreman's job will vary considerably with circumstances, and will in general be determined by the following factors:

1. The nature of the product manufactured, and the degree of technical knowledge or trade skill exercised by the foreman;
2. The extent to which routine work prevails over individual or intermittent production;
3. The proportion of skilled, as compared with unskilled, labour;
4. The degree of change, reorganisation, and state of emergency prevailing;
5. The number of employees controlled, and the size of the entire organisation;
6. The number and ability of staff assistants, such as clerks, charge hands, section leaders, and so on;

7. The degree of assistance rendered by specialised departments, such as Employment, Planning, Inspection, Costing, etc.;
8. The degree of authority assigned, and the extent of the discretion allowed to him by the management.

All these factors naturally affect the exact duties of the foreman. For instance, at one extreme the character of the work may be so highly technical, so individual, and confined to so few men, that the foreman spends most of his time on work peculiar to his trade and product. At the other extreme the actual process may be decided and controlled by a technician such as the chief chemist or chief engineer, thus leaving the foreman to concentrate on output.

F. J. Burns Morton in *Introduction to Foremanship*.⁴⁵

The modern conception of the foreman's responsibility is that of department manager; as such he is directly responsible for the application of labour and machines to a prescribed task, and for ensuring that man and machine become an effective combination. To the workpeople their foreman, inevitably, is the representative of the factory management. To the factory officials the foreman is the point of contact of management with the employees. All day-to-day business relations between management and workpeople must be through foremen. Only in exceptional matters does direct representation to management become necessary for the workpeople: when it does, the matters involved are either too big for foremanship solution, or foremanship has failed. Competently to control the activity of a hundred workers—for the foreman is often the centurion of modern industry—he must, theoretically at least, be relieved of all routine. Only by this means can the foreman give full attention to his primary responsibility—supervision of men's work.

Since the application of labour and machines is almost the final phase in organising production, the foreman is the individual who sees, hour by hour, the degree of effectiveness of management and the efficiency of production organisation and planning system. Thus it is vital for him to know, in intimate detail, the precise responsibilities of all who are concerned with the factory and its procedure, so that he may bring to light faults in management and in the operation of the system. Just as the foreman must eliminate bad workmanship and bad discipline within his own department, so also should

he be alive to faults resulting from bad management or bad system imposed upon him. In both cases the essence of good foremanship is to bring faults to the notice of those responsible in a diplomatic but persistent manner until curative action results.

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As organisations become larger the responsibility of the foreman changes from that of general factotum to that of the specialist in directing and obtaining the best from the human energy upon which, in the last resort, the success of a manufacturing unit must depend.

It has been demonstrated that the foreman has a most important part to play in the carrying out of the arrangements. To the extent to which he understands the principles at work, and uses his best efforts to make them effective, he has a great influence on the smooth running of the whole programme and its timely performance.

D. H. Bramley in *Introduction to Foremanship*.³⁹

The foreman is the point at which management is interpreted to the employees; he is the first arch in the bridge that leads from operation to the highest point of control. It has already been said that however good the policy of management, it can be rendered ineffective by weakness in supervision. This is more true in regard to the Labour function than in regard to any other point in management. In the controlling of production, weakness of supervision can be partially countered by the methods and documents that form the system. But in the management of the men and women in the factory, weakness or neglect in supervision cannot be countered by anything at all. In short, unless the foremen understand and admit the significance of giving consideration to the human factor in industry, the most enlightened attitude of management in this direction will fail of its real purpose. Put into other terms, it might be said that the key to the success of a sound policy of Labour Management and Welfare is the extent to which the foremen in the enterprise accept this function and whole-heartedly co-operate in putting it into effect.

Edward Brech in *Introduction to Foremanship*.⁴⁰

CHAPTER VII

THE HUMAN FACTOR

"We know now that the basic proposition of the work and dignity of man is not sentimental aspiration, or a vain hope, or a piece of rhetoric. It is the strongest, the most creative force now present in this world."

From a Broadcast by President Truman, 10th August, 1945.

"We live in a machine age, and the world has worshipped at the shrine of the practical man and of technological achievement. But we know that progress as machine-users can lead only to disaster unless we also have progress as human beings."

Miss Ellen Wilkinson, Minister of Education, speaking as President of the first Conference of UNESCO in London, 1st November, 1945.

"The worker in industry is seeking a living, that it may provide for him the means to a life outside industry. Management, consequently, is not dealing simply with workers as so many 'hands' but with workers as individual men—men with a multitudinous variety of interests, of an infinite complexity of temperament, endowed with widely diverse degrees of capacity in different spheres, reacting to outside influences in many varying ways, capable in the mass of wonderful feats of combined enthusiasm and dynamic action, yet individually distinguishable from the very movements of which they form a part. The concentration of such complex material upon a common task is primarily the task of that leadership which is sympathetic yet strong; conscious of its responsibility to the worker. . . . Without such leadership, management will find, as it has found, that science is of little avail, that organisation may be but a hollow framework, and industry, instead of reverberating with the clangour of corporate effort, may resound with the clash of battle."

Oliver Sheldon.—The Philosophy of Management.⁸⁵

No organisation can continue to exist except by virtue of the service of individuals associated within it to achieve the objects for which it was formed. That service may be voluntary throughout, with no financial incentive, as in the case of the ordinary amateur cricket club, or may be compulsory through-

out, also with no financial incentive, as in the case of a conscripted army; although, in the latter case, a certain financial incentive is provided by the emoluments resulting from promotion. In industry, on the other hand, service is voluntary (except that the economic consequences of withholding service may be starvation), but on a basis of remuneration which may be either fixed or dependent on results.

(Whether there is a financial incentive or not, service is provided by human beings who may serve whole-heartedly, or grudgingly; and no person in authority dare forget that on him depends to an important degree the attitude of those under his direction toward their particular task.) He may compel a superficial and precarious obedience by virtue of his constituted authority, or his economic power, but allegiance must always remain doubtful and liable to vanish at any moment, unless it is rooted in willingness to serve.

(This willingness may be induced to a limited extent by higher pay, but competition and other factors tend to rule out that remedy as an outstanding one, although in certain circumstances high wages and low unit costs are not incongruous—notably in America.) (High wages alone are not a reliable solution, partly because every individual has certain social instincts and physical needs that might advantageously find expression through his industrial occupation. Unless there is reasonable acceptability about all the conditions within industry, there will sooner or later be reaction and resentment which are bound to poison the minds of the whole personnel.) Further, the mind does not change its characteristics according to the subject with which it is occupied; and the equal citizenship that is the right of every adult cannot but be remembered within the confines of a factory, should it happen that tradition and limitations of management outlook tend to repress too rigidly any reasonable desire for self-expression by the workers.

(The very liberty of the individual,) which is our greatest heritage and highest aspiration, (constitutes a human problem in industry) calling for the utmost skill in administration that it is possible to achieve. Undoubtedly such skill has a psychological basis, but it has no less an ethical basis. The intricate, delicate, and elusive problem of the human factor will not be satisfactorily solved by human intellect alone but partly—perhaps mainly—by human character. It is not the function

of this book to enlarge upon the development of character; but it is appropriate to indicate some of the ways in which character may find expression through a striving towards recognition of the spirit of equal citizenship within the industrial régime.

To say this is not to put forward the proposition that sentiment should take the place of sense, or that in respect of any class in industry conferment of rights must be accompanied by remission of reasonable duties. Life without justice, order, and discipline is licence—a reversion to the law of the jungle—and if industrial life is to become what it can and should become, discipline of an appropriate kind, to the necessary degree, and in a form which is honourable must be mutually evolved, accepted, and self-imposed by *all* engaged in industry, whether employers or employed and whatever their status or occupation.

The point may be made that the problem of the human factor is not peculiar to the ranks of process workers, but naturally for the most part the subject is discussed in terms of these workers as being the largest unit numerically in industry. It is true, of course, that a main function of the Trade Unions is vicariously to make the process worker articulate in his own interest; but trade union influence has stood in the main for a constructive approach to industrial problems, though Unions have their own difficulties, and they do not always succeed in persuading their constituents to adopt a just and impartial solution of a trade dispute.

(A main objective of those who are responsible for the management of industrial undertakings is to recognise and give adequate expression to a spirit of equity such as should satisfy legitimate aspirations within the framework of the best management practice and working conditions. Having done that, they will be justified in looking for an adequate response, inspired by a corresponding spirit of equity on the part of those for whom they are responsible in the industrial sphere, since due recognition of rights involves responsibility for reciprocal action)

THE PERSONNEL DEPARTMENT

(There are large numbers of businesses where a Personnel Department would seem an extravagance, and where the works manager and foreman, either separately or jointly, can do all that

is thought necessary in the selection, promotion, and discharge of all personnel paid weekly by time or results.) In such cases the other duties, such as keeping personnel records, that might attach to a Personnel Department are quite likely to be performed by the Time Office. Yet, again, there is sometimes a Welfare Department which may help in these directions, though the tendency is for such departments to concern themselves mainly with physical matters of hygiene, and social matters concerned with recreation.

(Where the business is large enough to necessitate a Personnel Department, it is most likely to be called an Employment Department,) as being concerned primarily with employment questions. The broader name of Personnel is to be preferred, where the intention is to give the fullest scope to the individual development of employees. There is, of course, every reason why a department of this nature should concern itself with all personnel, whether in works, warehouse or offices, up to and including the rank of supervisors (a more inclusive term than foremen).

(One idea behind the conception of a Personnel Department is the provision of a substitute for the personal touch between employer and employed which the complexities of modern business have largely rendered impracticable.) It is very much the same as substituting the reception clerk for the hotel proprietor. (Maximum success depends on the right person being chosen to deputise,) but at worst someone must be chosen, who will be on "point duty" at all convenient hours. It is, in fact, a first principle that a representative of the Personnel Department should be accessible during working hours to every employee at times that are convenient to the latter.

The mere inauguration of a Personnel Department is apt to seem an encroachment on the authority of managers and supervisors, though that criticism could be levelled, with as much or as little justice, at a Planning Department, and has been in many cases. The acid test is the benefit such a department can be to the organisation as a whole, bearing in mind that old haphazard standards of personnel service, limited by the time which a manager or foreman could give to it, are no longer good enough, if there is to be that individual attention that the long-term interest of the business and of all those associated with it demands.

(The Personnel Department is to be understood as the embodiment of a function, and there is no contradiction in using the term even if the functional elements involved are carried out by different individuals and/or under different labels. Further, the function has little effectiveness except as the instrument of a personnel policy laid down by the Higher Management. No Personnel Department head can of his own personality and initiative achieve maximum success, unless he is the accredited representative of the Higher Management, who cannot, in the eyes of the worker, be divested of their responsibility. The Personnel Department executive should constitute a channel of appeal for the workers and must therefore act with special circumspection.)

Personnel Management.

Although there are wide variations both in regard to the status of the Department in the managerial set-up and to the functions which it carries out, in the main the duties of a Personnel Manager or Officer (as he or she may be called) are :

- (a) To assist the Directors to formulate a clearly-defined and well-developed policy.
- (b) To ensure that departmental Heads and Supervisors fully understand and apply the Company's policy in their day-to-day contacts with the employees.

In the carrying out of these functions it is imperative that the Personnel Manager should have the support of the chief executive of the Company, and logically he should control on behalf of the chief executive all specialised personnel activities for all classes and grades of employees.

(Among the activities which are generally accepted as appropriate in a personnel department, but which vary necessarily in different circumstances of location, industry, and tradition, are recruitment and selection; induction of new employees and induction training; maintaining touch with employees through all subsequent phases; keeping of records and compilation of statistics; wage rates; maintenance of good working conditions; health services; employees' services; joint consultation; and the education and training of supervisory grades at all levels.)

The last item, the education and training of the supervisory grades, is of recent development. Formerly, the supervisor was usually appointed because of his technical skill rather

than for his ability to manage men. But with the growth of joint consultation at workshop level, and the recognition of the fact that it is the function of the supervisor to represent the worker to the management and the management to the worker, the supervisor's ability to manage men has become an increasingly prominent factor in selection procedures. Classes have been organised in Technical Institutions and in the larger companies for the training of supervisors, usually up to foremanship level (in the Technical Institutions and in some few companies even to executive level); lectures have been held and Discussion Groups formed; and the Ministry of Labour and National Service has run most successful Courses on *Training Within Industry* (T.W.I.) called respectively *Job Instructions*, *Job Methods*, *Job Relations*.

The object of these Courses is to assist in developing the supervisor's understanding of his own task of supervision and his ability (a) to demonstrate when necessary how a given job may best be done, (b) to improve existing job methods, as far as possible consulting and collaborating with the man on the job, and (c) to make a worth-while contribution to the maintenance of satisfactory industrial relations in collaboration with the personnel manager and his staff. It will be noted that this is an extension of, and not a substitute for, the Courses in *Foremanship and Works Supervision*, referred to on p. 380.

Much too gradually the importance of junior supervision as the focal point of good industrial relations has been recognised, but this aspect of management can be expected to develop considerably in future years.

In the next two chapters, and in the second part of this one, the salient features of the main activities of a Personnel Department are outlined; and a few additional notes are given below on four of these activities:

Job Specification.—A reasonable basis for the major portion of personnel work is a specification of each job that may sooner or later have to be filled. The preparation of these specifications involves close collaboration with managers and supervisors; and, until the practice is established and the benefits realised, it is apt to be considered unduly troublesome and even "red tape," serving no practical purpose. On the other hand, only thus can the Personnel Department really

help in the selection of new personnel, and only thus can a uniform policy of selection be carried out.) The clear thinking that will be called for in the first instance may be relied on to confer a permanent benefit on those concerned. The method rules out unjustified favouritism, and is a demonstration of good faith that may be expected to form a beginning of confidence in the Management, on the part of those selected for employment.

(Job specification involves consideration of vocational tests) to discover whether the applicant complies with the specification. The tests are obviously of most interest before an applicant has commenced any occupation; and yet so many factors enter into every occupation that it may be too drastic to follow vocational tests to the exclusion of practical trial. In this field the Personnel Department can do valuable work by holding a watching brief over every junior entrant until, by training and, if necessary, transfer to alternative employment, each new-comer can be fitted to a congenial and appropriate occupation, if such is available at the time.

The subsequent training of every new-comer, whether junior or adult, is a matter of the greatest potential value to the individual and the company. For some processes, the initiatory period may be very brief; but, in principle, an appropriate preparation for duties in new conditions and to new standards should be accorded to every member of the personnel. This initial interest should be periodically renewed on an organised basis, and suitable records kept.

Selection for Employment.—Under budgetary control the demand for additional personnel should be reasonably well known in advance. When this is the case, the Personnel Department can operate to better advantage in dealing with uninvited applications for employment and in its relations with the Employment Exchange. In any case, it is to be presumed that formal requisitions for additional personnel will be furnished by supervisors, under confirmation by managers.

Various delicate issues have to be faced in this connection; amongst them the use of Trade Union Offices in preference to Employment Exchanges, and the engagement of relatives of present employees in preference to others having no such connections. The Employment Exchanges are being increasingly used, and applicants, whose particulars are already known, are

required to register at the Exchange, and to come for interviews with others selected by the Exchange as apparently also suitable. Where there is a surplus of labour and jobs are correspondingly harder to get, it is difficult entirely to avoid heart-burning through real or apparent favouritism. (The only safeguard is to have a common yard-stick for all, and, where qualifications are reasonably equal, to give preference along the lines best calculated to build up goodwill amongst the personnel generally.) As mentioned earlier, (it is through job specifications that the Higher Management may exert a maximum influence towards both equity and efficiency in personnel selection.)

With adult workers it is a reasonable principle that the supervisor under whose direction they are to work should be a party to their selection; just as, when services are no longer required, the Personnel Department should be a party to their termination. In this sphere the ability and tact of the Personnel Department Head is put to a severe test. Only if the Personnel Department can handle engagement and its termination in happy relation with supervisors and managers, can it hope to function with any satisfaction in those more difficult intermediate stages of transfers and promotions. For the Personnel Department to aspire to collaboration in these matters is to assume that its Head has considerable administrative qualities, otherwise he or she can hardly expect to rise above the level of the reception clerk of an earlier illustration. Whether this should be so or not is again a matter of Higher Management policy. There is a great deal to be said for the Personnel Department being in really responsible hands so long as that does not lead to an autocracy that hinders the proper development of responsibility and initiative on the part, particularly, of supervisors.

Incentives.*—While a Personnel Department is unlikely so have control of, say, a Rate-fixing Department, for applying a system of payment-by-results, it is concerned with the means adopted to obtain efficiency of output and satisfaction of workers. These issues react on the whole cycle of engagement, transfer, promotion, and perhaps termination.

One, and not the least, of the problems attaching to payment-by-results is the inequality of reward as between brawn

* See pp. 108, 238 and 263.

and brain, if the terms can be used without offence. Because it is usually easy to measure the work done by a machine-operator, he will be paid more often than not by results, while the highly skilled tool-maker, who transfers his skill to the tools that enable the machine-operator to perform his task, is liable to get actually less pay over a given time, and not always with less expenditure of physical energy.

There is also the case of the supervisor and other shop personnel, such as examiners, whose output is not tangible enough to be measured for purposes of payment-by-results. There are, again, auxiliary office personnel of many kinds, all contributing their part to make it possible for the machine-operator to produce at all.

These factors have resulted in payment-by-results being sometimes made co-operative, if not precisely collective, the machine operator's reward being apportioned so that he gets an agreed major part of the extra pay earned under his job rate, and the balance passes to a pool for division amongst those whose work is not measured, or measurable, in a similar way. Whatever the formula adopted for sharing the rewards, there is an element of equity in the principle which is highly commendable. Its introduction is usually contingent on an increased efficiency that will enable, say, three-quarters of the new earnings to satisfy the machine operator, according to his previous standards, and allow the other quarter for the pool without any increase of unit cost.

The interests of equity, as represented by equal opportunity, might perhaps be no less well served by time payment all round without payment-by-results for anyone. This method hardly serves as an incentive, unless the conditions of employment in regard to wages, rates per hour, and other aspects, such as pay for holiday, regularity of employment, etc., constitute a specific inducement in themselves for enthusiastic service as compared with other available employment. There is no doubt that the satisfaction of employees is a matter calling for the most careful consideration; and the means to be adopted are likely to vary according to local and other conditions, and to go a good deal further than what is sometimes called the "cash nexus."

In one considerable industry, that of Dyeing and Cleaning, where seasonal fluctuations necessitate short-time working at one period and late working at another, the practice is followed

of paying to time-workers of over five years' standing a fixed wage throughout the year. In the event of the late working being more than enough to counterbalance the short-time working (that is, the time paid for and not worked), the excess is paid as overtime at the rate of time and a quarter at an annual settlement, but no adjustment is made if late working is insufficient to counterbalance the time paid for but not worked. This is an endeavour to provide regularity of income where regularity of hours of employment is not, or has not been, possible. Considered on a wage cost basis, the employer is likely to pay more than when each week's time working is paid for on its own merits; but the intangible compensations of fewer changes in personnel, and therefore less wastage of training, and increased goodwill (other factors being favourable) make the arrangement of advantage to all parties. The scheme does not apply to piece-workers, who have the opportunity of much increased earnings in the busy season which the time-workers do not have, and therefore is some contribution towards holding an equitable balance between the two classes of workers. The piece-workers are guaranteed only three-quarters of the time-worker's wage in the slack season.

The question of guaranteeing basic earnings under any payment-by-result system affects considerably the value of the system to the worker. Industries operating under Trade Boards * do not have any guaranteed minimum weekly earning for piece-workers, although the piece rates themselves are permanent and binding on all employers alike. This is known as the straight piece-work system. Against this, in the engineering trades, for instance, where premium systems as well as piece-work are worked, earnings are guaranteed to the extent of the corresponding time wages for the hours worked. If this seems to suggest that the employer is at a disadvantage, the remedy lies in four directions, namely :—

- (a) adequate and properly applied organisation and planning for production;
- (b) maximum accuracy in rate-fixing to provide a proper standard of reference;
- (c) maximum attention to training of the worker to reach that standard;
- (d) subsequently, conscientious work on his part.

* See p. 295.

Informing the Personnel.—A passing reference has been made to the disclosing of information to employees. For present purposes it is convenient to consider information in relation to personnel in a broad way, and to make its dissemination a primary duty and study of the Personnel Department; though an Information Bureau could, and doubtless would, render valuable help to the Personnel Department in this connection.

Information can, of course, be either of a public or private character. Safety-first propaganda might be instanced as public, and the opening of a new department as private.

It is immaterial to the general argument here what information should be considered for these purposes. Some of it would doubtless be closely related to the daily works routine, of orders received, of complaints from customers, of departmental outputs, of costs, of defective working, of accidents, of changes ahead in product, processes, standards or organisation. Some, again, would be social, concerned with recreation, education, or domestic events. Even the small-talk of the common house magazine serves a humanising purpose in the daily round of an existence that tends to be more and more mechanised.

The initiative in these matters could come from any quarter, but be more or less regularised by passing through a Works Council, or Supervisors' Conference, or any other suitable medium of wider membership than the Personnel Department alone. Along these lines the good faith of the Higher Management could be demonstrated without risk of distortion or appearance of patronage. Reasons for decisions could be promulgated with the decisions in an atmosphere that would not rule out any further explanation. A step would thus be taken towards the goal of co-operation without any breaking down of the lines of responsibilities, which if clearly and properly defined go far of themselves to establish the discipline that controls but does not cramp.

Suggestions from employees will grow in a favourable atmosphere of general, even if guarded, confidence. Competition for suggestions for a specific purpose may relieve individuals from the onus of seeming to push themselves forward, so arousing jealousies. Such a competition held, say, monthly could include one open event for unspecified suggestions. Prizes might be fixed in advance for the first and

second in each event, if judged worthy. Entries might be under code words and results announced accordingly, when the winners would doubtless disclose their identity. Alternatively, there is the more or less regulation suggestion box, which, more often than not, is not used for months at a time, largely perhaps on account of the lack of any organised scheme for inviting or stimulating suggestions.

The late Professor John Hilton,³⁵ in a series of broadcast talks, has stressed the importance of the process worker and the foreman as constituting in their juxtaposition the core of the human relationship problem. Two quotations will serve, perhaps, to attract the student to read the whole series; and, incidentally, to give a still broader interpretation of the idea of "informing the personnel."

I come back to the view that the only basis on which an industrial concern can thrive and endure is that of looking at it as a corporate affair in which every person, whatever his or her rank or grade, is a sensible and vital part of the whole. It is the fashion nowadays, in some quarters, to scoff at the idea that the "common workman," as the phrase goes, has any remnants of pride in the firm in which he is engaged, or any feelings of loyalty to it. Those who take that view, whether they are employers or agitators, do not know the common workman. That is their trouble. There is any amount of loyalty on offer for the firm that is worthy of it, and the employer who knows how to bring it out.

Take foremen as a body, comprising all sorts, and ask yourself what the employer is to do who wants to keep in touch with the workpeople. What is he to do in view of the foreman who stands in between? Ought he, in the interests of good foremanship as well as of good relations, to feel his way towards some sort of regular exchange of views between representatives of the workpeople and the heads of the firm, with the foremen taking part, and a very important part? If he contemplates such a scheme, let him put it to the foremen first. If he goes past them, and starts it as a scheme for getting past them, it will be a bad start. Let him put it to the foremen first, one by one; their response

to the idea will teach him a good deal. Let the foremen put it to the workpeople; and get a few nominated to talk the thing over with the heads. Then, if some such plan is approved and agreed, let the employer be ready with a well-thought-out constitution and procedure. Do not set up Works Committees or Councils without being quite sure how they are to be composed and what they have to do. Let them meet, not just when there is trouble to be smoothed down, but regularly; and be quite sure that every time they meet they have a full agenda. Consider well whether you are prepared to entrust such a committee with discipline; with the question of discharges; with advice as to promotions; with proposals for the introduction of new machines and systems; with the settlement of piece prices and bonus schemes; with a knowledge of the firm's financial position. Give careful thought to how far you are prepared to go with these and a score of other possible items for the agenda. Learn by the experience of others: there is an ample literature upon the successes and failures of firms who have tried Works Councils. If you cannot give your Works Council responsible duties and plenty of them, leave the thing alone. Councils that have little responsibility and less power become nothing but occasions for petty bickering. Don't put the workers' representatives in the position of having to scratch their heads to find grievances in order to have something to talk about at the next Works Committee meeting.

If this kind of regular formal consultation upon that part of the conduct of a firm that most closely touches the workers' interests is well thought out and well carried out, it can solve the riddle of going past the foreman, and it can be a real force making for good work, good order, and good business. Moreover, it will help towards engaging and absorbing more of the faculties of the worker than brawn and an ounce of brain. You cannot have everybody on your council, but you can have a rota and some sort of election of members. A good many will take little or no interest in it; but that is always the case with democratic machinery. The rest will take a new interest in their work and in the firm.

A more detailed exposition of the basic aspects of Personnel Management will be found in the June 1944 *Report of a Study Group*⁴⁸ composed of members of the *London Centre of the Institute of Industrial Administration*, from which are selected the following extracts, permission to reproduce which has been generously given :

INTRODUCTION *

. . . . The Group concerned with Personnel Management . . . took as their aim :

“ To arrive at a considered statement of the problems likely to arise in Personnel Management in industry in the period of transition from a war-time basis to a peace-time basis, and to make available before the cessation of hostilities for the benefit of industrial managers a considered programme of policy and methods for meeting these problems.”

Two factors will affect the solution of the personnel problems arising in the transition period : the first is the economic and social conditions prevailing during the period ; the second is the spirit in which managers approach the problems.

In regard to the second, the Group are unanimous in the view that there is little hope of finding a satisfactory solution to any of the personnel problems unless the right spirit on the part of industrial managers underlies the machinery created to attain their aims. This spirit would be reflected in the policy adopted, both within the individual organisations which make up the country's industrial system and in the National Agreements between the representatives of Employees, Managers, Employers, and Government. Accordingly, the Group gave considerable attention to the formulation of this policy, with particular reference to the principles on which it should be based, as well as to the means by which it could be effectively translated into action. These principles as applied to the individual organisations are set out in the section on *Aims and Principles of Personnel Policy for Industrial Organisations*, and as they apply to national employment policy they may be summarised as follows :

- (1) Security of employment, though not necessarily continuity in any one organisation.

* Wherever in this Report the term “ Institute ” is used alone, it refers to the *Institute of Industrial Administration*.

- (2) Justice and fairness in regard to terms and conditions of employment and in the exercise of authority by those responsible for management and supervision.
- (3) Fair standards of wages and salaries.
- (4) Working conditions that include safeguards against adverse effects on health.
- (5) A sense of responsibility on the part of those in authority in respect of appreciation and recognition of the claims of employees as human beings.
- (6) Consultative participation by employees in the management of their organisation and the framing of conditions, though not in respect of technical, financial, or trading policy.

The Group are firmly convinced that without national agreement on these main elements of industrial employment policy no adequate solution to the transition problems can be found.

THE DEFINITION AND SCOPE OF PERSONNEL MANAGEMENT

1. Definition.—Personnel Management is that part of the process of Management specifically concerned with the people employed in an organisation. Its purpose is to establish and maintain sound personal relations at all levels of the organisation and to secure the effective use of personnel, by ensuring such conditions of employment as will enable all persons in the enterprise to contribute most effectively to its purposes in the performance of their duties, as well as to attain those personal and social satisfactions which they tend naturally to seek within their working environment. (This entails giving adequate consideration to psychological as well as physical factors.)

2. Analysis.—It follows from the nature of Personnel Management that every Executive or Supervisor, from General Manager to Foreman, has a responsible part to play in it, in so far as he or she is concerned in the achievement of the harmonious and effective operations of the human element in the organisation. On the other hand, there are certain specialised activities that will need to be considered in the application of Management in relation to the people employed.

Accordingly, the Personnel Function of Management has two aspects, which may well be located in different sections of the

organisation in the larger units, but will almost certainly be combined in the smaller units. These two aspects may be described respectively as :

- (a) The general responsibility attaching to Executives and Supervisors in respect of their management and supervision of the employees under their jurisdiction; and
- (b) The special or functional responsibilities attaching to the Personnel Executive(s) to ensure that personnel policy is appropriately framed and carried out : this includes responsibility for the effective discharge of routines and procedures connected with the employment of people, and the observance of legal obligations.

3. Scope.—The fields of activities relating to the employment of people, and therefore covered by the whole Personnel Function, may be divided into the following main classifications :

- (a) Personal relationships, including mutual consultation, and individual guidance, where required, on Employees' problems.
- (b) Organisation relationships, including definition of responsibilities and duties, the notification of appointments, transfers, etc., and organised mechanisms for joint consultation and the dissemination of information.
- (c) Employment procedures, including labour supply, and the determination of conditions and regulations of employment.
- (d) Education and training—operative staff (both factory and administrative), supervisors and executives.
- (e) Physical working conditions, including matters of health, convenience, and safety.
- (f) Social services and amenities, internal and external to the firm : physical, educational, social, or recreational.

The extent to which these fields of activities are appropriate, either to the special responsibility of the Personnel Executive or to the more general responsibility of other Executives and Supervisors, is not a matter on which any general recommendation can be made, except for the prescription that the Personnel Executive will necessarily be functionally interested in, and should therefore be associated in some way with, all of the activities covered by these six groups.

Note.

While this Report was in the press, the *Institute of Labour Management* * have published their official definition of Personnel Management. Because of its very close correspondence

* Now the *Institute of Personnel Management*.

with the one given above, it is felt desirable to reproduce it in full :

“ Personnel Management is that part of the management function which is primarily concerned with the human relationships within an organisation. Its objective is the maintenance of these relationships on a basis which, by consideration of the well-being of the individual, enables all those engaged in the undertaking to make their maximum personal contribution to the effective working of that undertaking.

“ In particular, personnel management is concerned with :

“ Methods of recruitment, selection, training, and education and with the proper employment of personnel ;

“ Terms of employment, methods and standards of remuneration, working conditions, amenities, and employee services ;

“ The maintenance and effective use of facilities for joint consultation between employers and employees, and between their representatives, and of recognised procedures for the settlement of disputes.”

AIMS AND PRINCIPLES OF PERSONNEL POLICY FOR INDUSTRIAL ORGANISATIONS

A.—Aims.

1. To enable the organisation to fulfil or carry out the main items which have been laid down as the desirable minima of general industrial employment policy (see Introduction).

2. To ensure that the employees of an organisation are fully informed on these main items of policy and to secure co-operation in their attainment.

3. To provide within the organisation such conditions of employment and procedures as will enable all employees to develop a sincere sense of unity with the enterprise and to carry out their duties in the most willing and effective manner.

4. To provide the organisation continuously with adequate competent and suitable personnel for all levels and types of occupations required.

B.—Principles.

1. To establish and maintain a Personnel Management Function, responsible to the Chief Executive and adequately financed for the fulfilment of its responsibilities.

As a corollary, the broad lines of the Personnel Policy of the organisation should be defined by the Board of Directors on a parity of importance with other major aspects of policy.

2. To guarantee to all Employees a right of personal and confidential access to the Personnel Executive(s) or the Executive acting in that capacity.

3. To afford the greatest possible degree of stability in employment. This implies :

- (a) Opportunity of permanent and continuous employment for competent employees.
- (b) Adequate and objective methods of selection prior to engagement and of review during employment.
- (c) The provision of appropriate training facilities (within or without the enterprise) to enable employees to secure the competence required :
 - (i) for effective performance of duties ; and
 - (ii) for promotion when so selected.
- (d) The filling of senior vacancies by up-grading and promotion, so long as actually or potentially competent candidates are available.
- (e) A guarantee against unfair dismissal
- (f) Adequate consideration of the influence on employment of the organisation's policies and plans regarding production and distribution, so as to avoid employee displacement so far as that is at all possible.

4. To observe the recognised standards of Fair Wages. (This would not preclude the determination of standard Job Classifications and Base Rates or the operation of Output and other Bonus Schemes, provided they fall within the definition of Fair Wages).

5. To guarantee fairness in the maintenance of discipline and to encourage Employees to accept responsibility for discipline.

6. To maintain a high level of working conditions, but regarding as a minimum the fulfilment—in letter and spirit—of the Factories Acts and other industrial Legislation and Regulations, with particular reference to adequate provision for the prevention of accidents, the rendering of first-aid, and the safe-guarding and maintenance of health.

7. To establish effective procedures for regular consultation between Management and Employees, in a genuine desire to keep Employees fully informed of all matters bearing on their employment and to enable them to contribute to the effective management of the enterprise.

8. To welcome and accord full freedom of association in Membership of Trade Unions, but to accord equality of treatment to members and non-members alike.

9. To assist Employees in the development of social, educational, and recreational amenities and to encourage their collaboration with nationally or regionally established facilities; also to avoid the provision of facilities as an inducement to employment.

10. To maintain these aims and principles of Personnel Policy without discrimination—though with the necessary differences of application—in respect of all types and grades of Employees, using that term in its widest sense.

THE PERSONNEL PROBLEMS OF POST-WAR INDUSTRY*

In selecting the problems to be studied, the Group have been governed by the general Terms of Reference, specifically directing the investigations to the management aspects of post-war industrial development. Accordingly, matters concerned with the procedures and practice of Personnel Departments have been deliberately passed over, as also have the wider "social" issues.

Training.†—Closely allied to the problems of the readjustment of personnel in the transition period are those of training, although the latter will have a rather longer-term character than the former. Without going in detail into the many problems that can be raised in relation to industrial and commercial training in the transition of industry to its peace-time basis, there appear to be three problems of primary importance requiring immediate attention :

- (a) The fact that a large proportion of the personnel transferred to peace-time industrial and commercial occupations may not have had adequate training for such occupations.
- (b) Shortage of persons competent to train others, bearing in mind in particular the fact that, generally speaking, Supervisory Staffs have not been trained in the art of training or instructing their operators or subordinates.

* The Study as published, to which the student is referred, begins with this Section, which opened with the consideration of Reconversion and Demobilisation, and of Reinstatement and Readjustment of Personnel. In view of the progress that has been made in these directions, that part of the Study which deals with these subjects, though important, has been omitted here. The Section continued as above.†

(N.B.—The recommendations in the Report will apply with equal force when the "transition" period is over and normal conditions have returned.)

- (c) The special significance that will attach to industrial and commercial training if adequate mobility is to be maintained in industry as an essential part of its effective adaptation to post-war conditions.

It is the feeling of the Group that with collaboration of the Employers Organisations, the Trade Unions, and the relevant Ministries, the means of meeting these problems can be readily developed, even in advance of the cessation of hostilities, and the following broad lines of solution are recommended :

- (i) In principle there should be a clear acceptance in industry of the importance of training.
- (ii) Training may be carried on either within the organisations concerned, or at appropriate educational institutions. In the case of the larger organisations, it will obviously be possible for extensive internal training facilities to be developed, whereas the smaller firms may find it more useful to rely chiefly on the educational institutions, adding the final specific touches within their own organisations.
- (iii) Acceptance by industry of the principle that training should be based on Job Analysis or Grading.

This principle has a particular pertinence to industrial and commercial training required in the earlier phases of the transition period in view of the extent to which the years of the war have witnessed a process of "de-skilling," i.e., a breaking down of complex operations into a series of simpler ones performed separately. The Group feel that it should be possible to organise Job Analyses for the major industries on national lines, that would give far greater value in terms of mobility, by providing a closer degree of co-ordination in industrial training facilities.

- (iv) The Technical Colleges and the Government Training Centres have a particular function to fulfil in the provision of : (a) a basic general training for all aspects of industrial and commercial employment ; (b) those specialised lines of training for which the requirements of any individual firm are small and which they are therefore not able to set up internally on an adequate standard.

The Colleges and Centres also have a special service to offer to the smaller firms which cannot meet any of their own training requirements internally.

- (v) The Senior Technical Colleges have the further function of providing basic Courses in Management and Supervision, including those of the usual intensive "refresher" type (full-time or part-time).
- (vi) Those responsible for the formulation of industrial policy should give special consideration to the resumption of apprenticeship schemes where appropriate, bearing in mind, however, that the needs of mobility of industrial personnel, and the development of education up to the age of eighteen, may well place the problem of apprenticeship in quite different perspective from that of pre-war days.
- (vii) Those specialised branches of industry which call for techniques of a highly specific character (such, for instance, as mining or heavy chemicals) should be encouraged to formulate their own policy in regard to training and upgrading, but also providing for the requisite degree of mobility and adjustment to changing circumstances.

Wage and Salary Levels—Incentives.—Problems concerned with the level of wages and salaries are likely to be among the most complex and difficult in the transition period, but because of the extent to which they are dependent upon national policy in regard to price stability, income tax, social security expenditure, and similar matters, it is not easy to determine in advance the lines along which solution may be sought. There are, however, certain fundamental points which the Group feel should be borne in mind :

- (a) The major issues in national wage and salary policy—questions like the inter-relation of job rates, the position of women's rates compared with men's, the comparative levels of juvenile rates, whether the basic week will be 40 or 47 hours, and so on—are not likely to be settled effectively within the first years after the war.

Until settlement is reached on many of these issues, there will be numerous complications to contend with, arising out of the unbalanced war-time rates in different jobs and grades, and as between men, women, and juveniles.

- (b) Wage and salary levels are likely for some time into the transition period to be maintained at the high standards reached during the war—a factor which emphasises the importance of maintaining the highest possible effectiveness in the utilisation of labour in every form.
- (c) The resumption of peace-time production will entail a large demand for women for women's jobs and juveniles for juvenile jobs, as against the war-time tendency for both grades to be largely employed in jobs of a higher-rated grade. On the other hand, it may be anticipated that there will be greater scope for the employment of women in a number of skilled occupations for which they have been trained during the war and that, as members of their appropriate Trade Union, such women will rightly expect payment of the full skilled rate.

N.B.—The Group are of the opinion that the admission of women to membership of the skilled Unions will have virtually the force—as far as their rates are concerned—of a continuance of the Agreement on the Extended Employment of Women.

Although it is not possible to lay down any detailed lines of approach to these many questions, the Group wish to submit two general recommendations :

- (a) That the solution to the problems of remuneration in industry should be sought—and in fact can only be effectively found—in a sound scheme of Job Grading on a national basis, providing for the analytical classification of operations through all industries and the establishment of appropriate rate groupings which can be readily applied within the individual organisations in each industry. Such a scheme should also take into consideration the relation of factory rates to the salaries of clerical and other staffs.

The Group are fully alive to the size of the task entailed in this recommendation and understand that tentative consideration is being given to a similar proposal by the representatives

of the Employers' Organisations and the Trade Unions, presumably in association with the Government. They would, however, suggest that the matter is one requiring special attention from the Management standpoint and that accordingly the Institute should set in motion at the earliest opportunity a special study of the problem with a view to making a constructive contribution to the national deliberations already in train.

- (b) That far greater attention needs to be given by industrial organisations to their juvenile employees, with particular regard to questions of earnings, development, upgrading, etc., and that every organisation employing juveniles should lay down a constructive policy as the basis of such employment. This is as much in the interests of the nation's future progress, as in those of the juveniles themselves and of the firm.

Closely related to the question of wage and salary levels is that of financial incentives. In principle, a sound scheme of incentives can be a useful means of increasing the effectiveness of labour utilisation, as well as providing an avenue for the employee's mental and emotional satisfaction. Developments during the war suggest that there is likely to be a widespread extension of financial incentive schemes in resumed peace-time production, a feature which the Group welcome, subject to the recognition of four fundamental points :

- (a) Sound production study and rate-fixing is essential to the effectiveness of such schemes ;
- (b) Any scheme of incentives should be developed in association with production control (planning and progress) procedures ;
- (c) From a psychological standpoint, incentive schemes should be such as to integrate the interests of the groups of personnel concerned ;
- (d) Consideration should be given to the value and importance of " non-financial incentives " in relation to financial ones.

Discipline.—The transition period need not give rise to peculiar problems in regard to the maintenance of discipline in industry, although certain developments that have occurred in relation to war-time needs have brought about changes in the character and methods of discipline customary in industry in pre-war times. This is particularly true of the Regulations introduced by the *Essential Work Orders*.

The Group wish to record their considered opinion that the principles contained in the *Essential Work Orders* are likely to be retained during the transition period, at least in modified form, but not removing the two essential features of :

- (a) A guaranteed weekly wage, with the accompanying week's notice of termination of employment ;
- (b) The Right of Appeal (by both employers and employees) in the event of either side feeling aggrieved by a notice of termination.

The Group also anticipate continuance of the more widespread resort to the official Arbitration machinery.

Employers and Managers should be prepared for the continuance of these principles and for a corresponding adjustment of their customary standards and methods of discipline; the repercussions are likely to be more acutely felt in conditions of peace than in war-time. As a contribution to preparation for the adjustments required, the following recommendations are submitted :—

- (i) That the standards of discipline within the individual organisation (*i.e.*, the regulations and conditions of employment) should be determined not by Employers or Managers alone but by joint consultation between Employers, Managers, and Employees. Whether such consultation is to be restricted to the customary Trade Union basis, or is to be representative of all employees whether organised or not, is a matter which each Company will need to determine in accordance with its own particular circumstances. (In this connection, the Group would point to the general principle of consultation which it has recommended as a feature of employment policy.—See *Aims and Principles of Personnel Policy for Industrial Organisations*, B. 7 and 8, *supra*, and *Joint Consultation Mechanisms in Personnel Management in Practice*, *infra*.)
- (ii) That, apart from the independent Appeals Tribunals maintained under the modified official controls, each individual organisation should establish an internal mechanism representative of Management and Employees such as to encourage its personnel to accept responsibility for the maintenance of discipline, *i.e.*, for the application and interpretation of the agreed standards and regulations.
- (iii) That the establishment of disciplinary standards on a consultative base should not in any way impair the individual responsibility of Managers and Supervisors for the maintenance of discipline within their own departments.
- (iv) That the establishment in the larger organisations of an effective and broadly-planned Personnel Function should be accepted by Management and Employees alike as a means of affording an objective guarantee of fairness in the application of disciplinary standards, uniform throughout the organisation.

Working Conditions.—The chief problems arising during the transition period in relation to working conditions in factories and offices may be expected to centre round making good whatever deterioration has taken place through shortage of various supplies and other war-time deficiencies. While it must be admitted that, especially among the smaller factories, there has been a not inconsiderable advance in standards, these gains have been widely offset by deterioration from the very high levels previously maintained in a number of leading firms. Moreover, there have been many relaxations of the provisions of the Factories Acts.

It should be one of the chief aims in the transition period to develop in factories and offices the highest possible level of working conditions as an important contribution both to effectiveness in work and to employee morale, through the promotion of health, safety, and contentment.

A particular problem in the transition period will be that of the length of the working week ; almost as an inevitable reaction to long hours during the years of the war there is likely to be an insistent popular demand for the 44-hour or even 40-hour working week. While this is undoubtedly a development to be recommended throughout industry, it can only be successfully obtained—without impairing the country's economic strength and stability—if there is the highest possible level of effectiveness in the utilisation of man-power. (In passing it must be noticed that the problem also has a social aspect, that of the utilisation of the extra leisure afforded, to which industrial and commercial managements cannot be entirely indifferent.)

Another feature arising out of war-time experience is the provision of canteens for employees. To the extent that local facilities for mid-shift meals are not adequate in quantity or quality, there would seem to be a sound case for continuing the canteen, in the interest of employees' health and well-being and so of effectiveness at work.

Industrial Relations.—Provided that sound economic and social policies are pursued by the Government, with a concerted effort towards the maintenance of "full employment," the Group do not fear any serious deterioration in industrial relations during the transition period. Certain of the war-time improvements may well be of lasting benefit, and the Group are convinced that the adoption of principles of industrial policy which are recommended in this Report—and which are based fundamentally on the wholehearted recognition of joint consultation on all aspects of employment policy—will enable industrial relations to be established permanently on a stable and progressive basis.

The Group are, however, acutely conscious of one important war-time trend which is likely to be carried over into the transition period in even more acute form and which may well raise serious problems. This is the tendency for industrial questions to be viewed—by employer and employee interests alike—

primarily or predominantly from a political standpoint. The problem has two aspects : that of national policy and that of issues arising within the individual organisation. With the former the Group is not here concerned as it does not fall within the set Terms of Reference. In respect of the second aspect the Group are keenly alive to the detrimental consequences to the well-being of the organisation that would follow persistence in a " political " attitude on the part of either Employer or Employee. On the other hand, they are equally of the opinion that if the policy and practice of Industrial Relations and Personnel Management advocated in this Report are adopted no such problems are likely to arise in serious form, or to be not amendable to a ready and reasonable solution, if circumstances should bring them into existence.

Health, Safety, and Social Amenities.—The greater attention given during the course of the war, both in the Defence Services and in industry, to the human requirements of the people employed is likely to have repercussions in the transition period through the expectation of its continuance. To a very large extent, problems raised in this connection are more appropriately regarded as issues of social policy than as germane to the individual industrial or commercial organisation. But in view of the possible resumption of pre-war practices in the provision of certain employee services, the Group feel that it is within their province to express a general opinion on two aspects :

- (a) **The Promotion of the Health and Safety of Employees.**—The experience of the war underlines the recommendation that from the outset of the transition period industrial and commercial organisations should take a positive interest in the promotion of good standards of health and safety among their employees and should collaborate to this end with the professional Medical Bodies and with locally established facilities. A valuable lead in this direction is likely to be afforded by the *Industrial Health Advisory Council* (established by the Ministry of Labour and National Service in 1943) and by the continuing research activities of the *Industrial Health Research Board* of the British Medical Council.
- (b) **Recreational Facilities.**—The second matter is perhaps best raised in the form of a question, which should be answered before any development is commenced in the transition period : is it desirable for individual organisations to provide their own separate sports and other recreational facilities, or is it not preferable for these to be provided regionally, in collaboration with Local Authorities and other interested bodies, along the lines of a Local or Regional Social Centre ?

Summary.—It has been the intention of the Group in the foregoing paragraphs to raise for consideration certain fundamental matters of employment policy that are likely to give rise to significant problems in the transition period. The advance consideration of such matters by Managers of industrial and commercial enterprises cannot fail to contribute to allaying substantially their possible adverse consequences.

The Group fully appreciate that many more issues relating to Personnel Management could have been raised, but these others would in the main require discussion and recommendation on points of application and detail which they feel do not fall within the set Terms of Reference and are more appropriately the province of the *Institute of Labour Management*. As far as the policy underlying the application of Personnel Management in the transition period is concerned, the Group's recommendations are contained in the following section.

PERSONNEL MANAGEMENT IN PRACTICE

In the course of their deliberations, the Group have been unable to escape the conclusion that the accelerated development of Personnel Management has been one of the major contributions of war-time experience to industrial progress. What has been attained goes far beyond the introduction of certain Departmental routines and can best be described as a beginning of the recognition of the importance of the human factor in Management, indicating that Personnel Management has an essential contribution to make to the effectiveness of Management as a whole, to industrial stability, and, in the narrower sense, to the level of output in production and other fields of work. It would be pertinent to quote here some published comments of the *Minister of Aircraft Production* (July 1943), who stated :

“ My whole experience in the aircraft factories has brought home to me the great part which good Personnel Management can play in the efficiency of our production. Personnel Management is not a hobby or a fad ; it is an essential element in the proper management of industry and has now become recognised as such by the majority of the more enlightened employers.”

The Group are accordingly unanimous in the view that one

of the major problems of the transition period will be to maintain this wider recognition of the significance of Personnel Management and to ensure complete agreement among all industrial Managers on the view that this function must be retained as part of the normal industrial structure. This problem is itself a multiple one and its main elements may be summarised as follows :

- (i) Securing agreement on the definition and scope of Personnel Management.
- (ii) Securing agreement on the interpretation of this definition into responsibilities and duties of the Personnel Manager and his Staff, and the formulation of their relations with other Executives and Supervisors.
- (iii) Ensuring among Management and Supervisory Staffs an appreciation of the significance of Personnel Management and so its acceptance by them.
- (iv) Similarly ensuring recognition by the organised industrial bodies, viz., the Employers' Federations and the Trade Unions.
- (v) Defining selection standards for Personnel Management Staff and securing an adequate supply.
- (vi) Determining and providing appropriate methods of training for such Staff.

As a contribution to these tasks, the Group wish to place on record certain general recommendations, not in terms of procedures or routines, but rather of the principles on which a sound Personnel Management function should be built up and the major factors that will govern its effective working.

There are two preliminary points to which the Group attach particular value :

- (a) The contribution that joint consultation has to make to effectiveness in Management, a fact which has been amply confirmed by war-time experience, as well as by the more advanced contemporary thought in regard to the principles of management.
- (b) The close linking of the Personnel Management function with the Supervisory Staffs in factory and office departments; too frequently in the experience of war-time production, the establishment of a Personnel Department has led to a weakening of the responsibilities of the Supervisory grades and to the interpolation of "a third party" between the Supervisor and those under his or her charge.

The Group feel that Personnel Management will fail in its purpose if this practice is continued : on the contrary, Personnel Management can only be effective if it is firmly established on the basis of acceptance by and continuous collaboration with the Supervisory grades, using them and their superior Executive grades as its channels of operation. The principle underlying this view will be found to be inherent in the definition of Personnel Management set out in the section on *The Definition and Scope of Personnel Management*.

The Group's recommendations regarding the organisation and operation of the Personnel Function can best be summarised under the following six headings :

(a) Responsibilities of the Personnel Executive.—Without going in detail into the activities of the Personnel Function or Department, the following are suggested as the main fields that should fall within their scope :

- (i) Responsibility for advising the Chief Executive on the formulation of Personnel Policy.
- (ii) Primary responsibility for framing procedures for carrying out the approved policy, including procedures to cover employment and "welfare" routines.
- (iii) Functional responsibility for conditions of employment in the concern (for all grades and types of employees).
- (iv) Functional responsibility for the planning and application of training schemes: operator (factory and office), supervisor, and executive.
- (v) Primary responsibility for "Welfare Services," such as Canteen, Medical Services, etc.
- (vi) Primary responsibility for selection of personnel, and functional responsibility for the planning of recruitment, for engagement, termination, and transfer, including promotion and upgrading.
- (vii) To render advisory assistance in the grading or classification of jobs as far as working conditions are concerned.
- (viii) To keep in touch with current developments in the advancement of Personnel Management.

N.B.—The terms "Primary" and "Functional" in relation to responsibility are used in the above points in the following meaning :

Primary is a direct responsibility for executive direction and supervision, and thus constitutes the "lines" * of the organisation.

Functional † means a specialised responsibility originating in expert knowledge and requiring : (a) that the executive is always consulted before decision is taken, pertinent to his function; (b) that he has authority to act within the framework of the approved policy, but must direct his actions through the executives and/or supervisors in the "lines" of the organisation.

(b) The Place of Personnel Management in the Structure of Organisation.—Again without going into detailed discussion on this matter, the Group wish to stress its importance for the effective working of the Personnel Function, and to endorse the main findings of the Broadsheet by L. Urwick.⁴⁹ These main principles can be summarised as follows :

- (i) In a simple organisation, the Personnel Manager should be responsible to the Chief Executive for all personnel matters.

* See pp. 206, 210 and 229.

† See pp. 205–208.

- (ii) In a multiple organisation, there should be a Group Personnel Manager among the Headquarters Executive Staff, responsible to the Chief Executive; at the distant units of the organisation, the local Personnel Manager should be directly responsible to the Executive in charge at the unit, but should retain a functional responsibility to the Group Personnel Manager at Headquarters.

The Group feel that attention should be drawn to three further points, viz. :

- (iii) The Personnel Executive's responsibility should apply to all personnel employed in the organisation.
- (iv) The title "Personnel Manager" should be accorded only to the Executive who carries responsibility for all items of his function, and that the title "Assistant Personnel Manager," or another appropriate descriptive title, should be accorded to Executives carrying only a part responsibility.
- (v) Personnel Executives and their staffs should be given training in the meaning and application of the "functional principle" of organisation, so that difficulties in the working of the Personnel Function are not encountered through the emergence of unsound relations due to misunderstandings of this principle.

(c) Organisation of the Personnel Management Function.—

The Group again feel that it would be inappropriate to deal with this matter other than in a general way, the more so since requirements can be met by a variety of arrangements according to the needs of the individual organisations, though all conforming to broad common principles. Comment is therefore confined to the following recommendations :

- (i) That the internal organisation of the Personnel Function should conform to sound principles.
- (ii) That there should be unified control of the Personnel Function in the (Senior) Personnel Executive.
- (iii) That this unification of control should also in principle include such specialists as the Medical Officer, whose services are employed or retained as an element in Personnel Management.
- (iv) That the "line" Executives and Supervisors should be subject to only limited contacts from the Personnel Executives and Assistants, *i.e.*, that the "line" Executives and Supervisors should not have to deal with more than one or two Personnel Management Staff in the course of normal activities. (This principle may well give rise in the larger firms to an arrangement by which the Personnel Function has a responsible representative attached to each Department or major section of the organisation, and through this Officer all normal contacts and procedures are carried out in respect of that Department or section.)
- (v) That particular consideration needs to be given to the application of these principles within the small and very small firms, which cannot be expected to establish—or may not be justified in establishing—a separate Personnel Function and Staff.

N.B.—It is felt that the Institute should inaugurate a special study as to how the small firms' needs can best be met, as the problem is wider than the Group's Terms of Reference,

(d) **Selection and Training of Personnel Executive and Functional Staff.**—It is the opinion of the Group that this is a field in which the definition of standards is more appropriately the province of the *Institute of Labour Management*. On the other hand, because of the participation of Personnel Executives in the total process of Management, and the significance of their function as a contribution to the effectiveness of Management as a whole, it is felt to be desirable to indicate the following fundamental principles in this context :

- (i) The qualifications required for effective performance as a Personnel Manager or Officer will necessarily vary in accordance with the nature and extent of the responsibilities to be undertaken. As far as the responsible Officers are concerned whose duties include the full range indicated in item (a) p. 244, it is felt that there are three basic groups of qualifications of equal importance, viz. :

- (a) Personal character or qualities of such a kind as to enable them to maintain good relations with superiors, colleagues and subordinates and to be accepted as responsible Executives by all members of the organisation.
- (b) Competence in Management in the accepted sense of the term.
- (c) Previous experience as a Supervisor and/or Executive in some function other than Personnel Management.

N.B.—In the case of persons who begin their early career within a Personnel Department and who have sought to continue in that field, arrangements should be made for them to be drafted out into responsible work in another function for a given period, prior to their accepting executive responsibility in Personnel Management.

- (ii) **Training :** Apart from detailed knowledge and experience of procedures and routines, including legislation pertinent to the activities of the Personnel Management Function, the training of the responsible executive personnel staff should include :
 - (a) The development of American, British, and other thought in relation to Personnel Management in the past twenty-five years, including the research investigations undertaken.
 - (b) Applied Psychology and Social Psychology.
 - (c) The industrial (economic and social) history of Great Britain.
 - (d) The principles of Organisation and Management in general outline.
 - (e) A general study of routines or procedures of Management in other functions.
- (iii) **Responsible Personnel Staff** should be afforded adequate opportunity for professional development by membership of, and participation in the activities of, the appropriate organisations : the *Institute of Labour Management*, the *Industrial Welfare Society* and the *National Institute of Industrial Psychology*. Facilities should also be made available for attendance at "refresher" courses from time to time and participation in research projects connected with personnel relations and other relevant matters.

Note.—The Smaller Firms.

In any consideration of the definition of standards of selection and training for the responsible Personnel Management staff, particular attention should again be given to the needs of the smaller firms, bearing in mind the fact that in many instances their requirements can best be met by providing training in Personnel Management for their existing Executives and Supervisors rather than by the appointment of a Personnel Officer. Some provision may also need to be made for a specialised Advisory Service to assist these smaller firms, in the absence of a Personnel Officer.

(e) Financial Budget for the Personnel Management Function.—The principle of setting a financial budget for the expenditure of the Personnel Management Function does not appear so far to have secured any widespread recognition. Nor does there appear to have been any consistent action in the recording and control of Personnel Management costs. Accordingly, there is not yet available any reliable experience as to levels of expenditure for the function.

There is no sound reason why the activities of Personnel Management should not be costed and appropriate financial standards set so that current expense can be controlled. A suggested schedule of items of expense for the function is set out on pp. 250–51. Expenditure on Personnel Management activities should be related to the total pay-roll figure as the appropriate reference basis; each individual concern should be able to work out for itself a satisfactory financial level, which would be amply justified by the contributions which Personnel Management makes to the effectiveness of Management as a whole.

(f) Joint Consultation Mechanisms.—An integral part of the Personnel Management organisation of every industrial and commercial enterprise should be a permanently established mechanism for joint consultation between Management and Employees. The principle underlying this mechanism is to be consultation between Management and Employees as representing not differences of interest but differences of function.

Without going in detail into the structure and operation of the mechanism, the Group recommend the following main points :

(i) *Structure :*

The consultative mechanism should be composed of two parts, viz. :

- (a) A Council or Committee composed of elected representatives of Management, Supervisory Staffs, and Employees; and
- (b) The ordinary mechanism for negotiations between representatives of Management and the Trade Unions.

(ii) *Terms of Reference :*

- (a) The Council or Committee should have as its Terms of Reference all matters affecting the employee during the continuance of his employment, except questions of wages where these are covered by Agreements and are dealt with by the organised negotiations referred to in item (i) (b) above.

Where special Committees are thought desirable for deliberation on specific issues, they should take the form of Sub-Committees of the main Council or Committee, with the right to co-opt persons with special knowledge or experience of the issues under deliberation.

- (b) For the second element, the Terms of Reference to be wages and conditions of employment in accordance with the national, regional, or individual Agreements signed between the representatives of the Employers and the Trade Unions.

(iii) *Constitution of Council or Committee :*

- (a) Employee and Supervisory Staff representatives should be elected; those of Management should be nominated by the Chief Executive. The Personnel Executive should be an *ex officio* member.
- (b) All employees should have the right to vote for representation from the outset of their employment.
- (c) Eligibility for election to membership of the Council or Committee should be restricted to employees with a minimum of twelve months' service in the enterprise, but there should be equal eligibility as between members and non-members of Trade Unions.
- (d) Representatives of the Supervisory Staffs should be elected by and from the Supervisory Staffs themselves, on the basis of appropriate qualifying conditions, which should not include the restriction of membership of a Trade Union.
- (e) The establishment of the "constituencies" for representation purposes should provide for adequate representation of the technical and administrative (including clerical) staffs as distinct from the Supervisory and Management Staffs.
- (f) The Management representatives should be few in number, leaving the employee representatives with a clear majority. The Management representatives should be responsible Executives.
- (g) All elected or nominated members of the Council or Committee should serve for a period of two years, with the proviso that there shall be annual nominations or elections of half the members in each category.

CONCLUSION

It would seem to be beyond question that the country in general, and industry in particular, are ready for the adoption of

a more progressive outlook on the human aspects of employment. War-time developments in almost every direction, and especially in the Armed and Civil Defence Forces, have emphasised the importance of the human aspects of organisation and the necessity for giving adequate consideration to the requirements of men and women in framing conditions of work. Much, for instance, has been done in the provision of "welfare" services and concerning selection and training, and a good deal also in regard to the easing of personal and emotional difficulties that adversely affect ability and willingness to work smoothly in the team. This experience under war-time conditions may well give rise to an expectation of its continuance in peacetime circumstances, especially by those who are returning to civil employment after fighting service abroad.

Awareness of this changing trend of opinion and belief in its importance have been the factors that determined the Group's approach to their tasks and so the interpretation of their Terms of Reference. Giving particular attention to the principles and fundamental policies involved, they have endeavoured to foresee the major issues which will confront industrial Managers after the cessation of hostilities and to indicate what appear to be the most useful practical lines of solution. Realisation of this now wider acceptance of the importance of the human element in the industrial structure is also the explanation of the emphasis that has been laid in the Report on the need for the continued development of the Personnel Function as a primary contribution to the smooth transition of industry from its war-time footing to conditions of peace.

That no reference has been made in the foregoing paragraphs to the important findings recently published by the *International Labour Organisation*, in connection with the *Philadelphia Conference*, is due to the fact that the documents only became available after the Group had virtually completed their deliberations. The Group do, however, wish to emphasise the very high value of these findings and in particular to welcome the *Declaration of Philadelphia* ¹⁵ as a close parallel to the principles of employment that they have themselves adopted and set out in this Report.

The Group of Members of the *Institute of Industrial Administration* (London Centre) who have been responsible for the

studies covered by the foregoing section of the Report would like to express their appreciation of the contributions and comments which they have received informally and personally from officials of the Organisations and Government Departments concerned with Personnel Management, including Members of the *Institute of Labour Management*.

LONDON : 30th June, 1944.

BUDGET FOR PERSONNEL FUNCTION SCHEDULE OF APPROPRIATE EXPENSE ITEMS

Personnel Manager:

1. Personnel Manager's Salary.
2. Personnel Manager's Direct Expenses (travelling, etc.).
3. Personnel Manager's Public Relations Expenses.
4. Assistants' Salaries.
5. Private Secretary's Salary.

Personnel Department:

6. Allocation of charges for overheads (light, heat, etc.).
7. Furniture and equipment : Depreciation and/or Renewals.
8. Current stationery supplies (including record cards and forms).
9. Salaries of Clerks and other Departmental Staff.
10. Functional Literature (mainly official sources).
11. Postages, telephones, fares, etc.
12. Advertisements of Appointments Vacant.

Health, Welfare and Safety Division:

13. Fees of Full or Part-time Medical Officer.
14. Nurses' Salaries.
15. Salaries of Safety Officer and Staff (if any).
16. Allocation for Special Medical Consultation (if allowed).
17. Allocation for Grants-in-Aid.
18. Allocation for Assistance re supply of Protective Clothing.
19. Supplies of Protective Creams, etc.
20. Depreciation and/or Renewals of First-Aid Room Equipment.
21. Medical and First-Aid Supplies.
22. Toilet Soaps, Towels, and similar supplies.
23. Membership Subscription to Industrial Welfare Society.
24. Purchase of Safety Posters.
25. Contributions to local Hospitals or Clinics.
26. Depreciation on capital cost and maintenance of physical working conditions in advance of statutory standards with the significance of a non-financial incentive.
27. Costs of Training School, Instructor, or Employee allocated to training of new entrants (factory or clerical).
28. Fees and Wages of Employees sent to part-time (day) training.
29. Fees and Wages of Juveniles sent to Day Continuation School (under voluntary schemes).
30. Fees and Awards for Employees at other Training Courses (own time).

Social Amenities:

31. Net contributions (if any) to provision of Canteen, including any food or drinks supplied during rest pauses.
32. Contributions to :
 Holiday Pay Funds (Voluntary schemes).
 Pension Schemes.
 Family Allowances.
 Sick and Benevolent Funds.
 Social and Recreational Facilities.
33. Grants-in-Aid for Travelling or Accommodation.

Employee Consultation:

34. Wages and Salaries of Employees, Supervisors, and Executives for time spent at Joint Committee Meetings.
35. Awards under Suggestions Schemes.

Supervisory and Executive Staff Training:

36. Membership Subscription to Management Library.
37. Purchase of Books for Company's Library.
38. Fees for Executive or Supervisory Lecture Courses or Conferences.
39. Incidental Expenses of Internal Training Scheme (*e.g.*, teas, visiting lecturers, visits, etc.).

Research:

40. Expenses of internal arrangements for, or contributions to external agencies conducting research into questions concerned with personnel relations and the development of Personnel Management.

Notes:

- (a) A number of these items of expenditure would have to be incurred in the absence of a separate Personnel Function.
- (b) Elements of expenditure arising under any of the above for A.R.P. or P.A.D. purposes should be excluded.
- (c) Expenditure under items 34-40 is strictly speaking a "General Management" Cost, although undertaken within the Personnel Function.
- (d) The Personnel Function Expense Ratio should be expressed as a percentage of the total payroll (*i.e.*, the Salaries and Wages of all members of the organisation, including Executives).

Students who are especially interested in Personnel Management, and have time at this stage to extend their reading to not more than one major work on the subject, should choose that of Dr. C. H. Northcott,⁵⁶ who deals most eloquently, authoritatively, and adequately with this vitally important matter.

CHAPTER VIII

INDUSTRIAL RELATIONS IN PRACTICE

This and the preceding chapter on the Human Factor, taken together, are the culmination, in importance, of all that goes before. The two chapters are complementary one to the other, but even taken together cannot do more than give a point of departure from which the student may start his own thinking-out of the problem. We are in a period of swift and profound change, technological, economic, and social ; we are passing through a new phase of industrial evolution ; and with all the mass forces let loose upon a distracted world to-day, a peculiar responsibility rests on all concerned in British industry to hold steadfast, and to continue to work forward to a just and equitable state of industrial and social relations.

BEFORE the institution of the factory system there were, generally speaking, no large employers of labour. The relationship of master and man was personal and traditional ; and while it cannot be supposed that the worker was always satisfied with his remuneration and conditions of labour, there was probably little conscious alignment of workers, as a section of the community, against employers as another (Capital versus Labour as it came to be called), such as developed with considerable rancour when the factory system had become firmly established. Whereas under the old régime of hand-work the worker had always felt himself to be largely his own master with considerable freedom of action (perhaps, more particularly, without any supervision or fixed hours of work), under factory conditions the power of the employer became so great that the employee, reduced simply to a wage-earner, had to submit almost completely to his domination. On the other hand, the new system brought large numbers of workers in the same trade together in one factory and thus fostered the growth of what is now known as “ class consciousness.” It began to be realised that, although a single workman had little prospect of being able to force an employer to listen to his grievances, joint action with his fellow-workmen, not only in the one factory but in other factories in the trade, might have some effect.

It is an accepted fact that many genuine grievances existed in the early days. The Industrial Revolution, which, as has been shown in an earlier chapter, cannot yet be considered to have ended, has been the cause of extraordinary changes in the life and social structure of England. It was inevitable that the transformation of an agricultural country, with few industries, into the "workshop of the world" in the space of comparatively few years should cause a profound disturbance in the manner of life of the population. Something of the same sort may be seen happening to-day in Russia; but in that case the Industrial Revolution is deliberately planned and the industrial methods which have been adopted represent the conclusions of the Soviet from study of the experience of the world—conditioned, however, by an economic theory of which the world has had no previous practical experience.

In the original Industrial Revolution, however, no one had any previous experience of machinery applied to industry, or, in fact, of the conditions of large-scale industry at all. The opportunities for making fortunes under the new conditions were soon realised; and, starting in the cotton and extending to engineering and other trades, industry expanded at a phenomenal rate. The growth in population was correspondingly rapid.

In the midst of such unprecedented events, with a new plutocracy of wealthy manufacturers arising to supplant the old landed aristocracy, it is not perhaps remarkable that little attention was paid to the fostering of good relationships between employers and employed. It is true to say that conditions of labour in the factories of the early part of the nineteenth century were definitely oppressive. In the next chapter mention is made of the beginnings of State supervision of industry, first in the matter of regulation of hours and later of factory inspection, and the fierce opposition encountered by those advocating reform.

HISTORICAL DEVELOPMENT

Modern industrial relations, like other aspects of our industrial civilisation, are exceedingly complex; and some fuller knowledge of the historical background is essential if one is to understand fully the system of self-government in industry by voluntary organisations of employers and workers which has developed during the last seventy years.

Even as early as the fourteenth century there had been attempts to regulate wages—the *Statute of Labourers* 1351 being an early example of legislation to this effect—and during the sixteenth century the State, by a series of far-reaching measures, had set out to regulate wages, industrial training, and employment generally. The Justices of the Peace were empowered to fix wages rates; and at the same time combination, either by employers or workers, for the purpose of altering wages or working conditions was expressly prohibited. With the growing complexity of industry—not because of the introduction of the factory system : that was to come later—and the increasing demand for non-intervention by the State in commerce and industry, such measures gradually fell into disuse by the middle of the eighteenth century, although they were not actually repealed until 1813 and then only because the wretched conditions during the early years of the factory system compelled the workers to petition Parliament again and again for this obsolete legislation to be made effective. But laws against combination in one trade or another continued during the whole of the eighteenth century, and in the years 1799 and 1800 the *Combination Acts* were passed, prohibiting combination in all trades.

Under the “domestic” system work was given out by the “capitalist” to be carried on in the worker’s own home, and industry was still supplementary to the main occupation of agriculture. The worker who possessed his small plot of ground adjoining his cottage, with perhaps a cow and one or two pigs which he could feed on the common waste land and from such land could gather fuel, was relatively in a favourable bargaining position. But with the advent of enclosures following the Agrarian Revolution, and the introduction of the Factory System, all this was swept away. As already stated, the workers, forced by economic necessity to enter the factories and reduced simply to the position of wage earners, had to submit at first almost completely to the domination of their employers, with the result that combinations were formed despite the laws prohibiting them. These were rigorously suppressed, and there resulted a general agitation for the repeal of the *Combination Acts* which, as administered, discriminated harshly against the workers as compared with the employing classes.

Following the close of the Napoleonic Wars and the general depression which followed them, there was renewed agitation to improve the conditions of the working classes and a Parliamentary enquiry was held, which resulted in the passing of the *Combination Laws (Repeal) Act 1824*, allowing combination without rendering the members liable to criminal prosecution. There followed a spate of disputes, and Parliament, alarmed by the situation, quickly passed a further Act in the following year which, while not expressly prohibiting combinations, made it difficult for the workers to take effective action without breaking the law. Nevertheless, the formation of trade unions continued despite the many restrictions imposed on them, and in 1867 a Royal Commission was appointed to examine the whole of the position of the trade union movement. This enquiry led to the passing of the *Trade Union Act 1871*, and this with the *Trade Union Amendment Act 1876*, clearly set out the legal definition of a trade union and defined the powers and immunities conferred on this type of organisation. These two Acts still form the basis on which our present union structure is built. From this time until the passing of the *Trade Dispute (Repeal) Act 1945* many enactments dealing with or affecting trade union organisation have been made. Of most importance are :

- (a) *The Conspiracy and Protection of Property Act 1875*. This Act dealt with peaceful picketing and *inter alia* laid down that any agreement or combination by two or more persons to do or procure to be done any act in contemplation or furtherance of a trade dispute shall not be indictable as a conspiracy, if such act committed by one person would not be punishable as a crime, the relationship between employers and combinations of workers thus becoming simply a civil relationship between equal parties. Penalties were also laid down in respect of breaches of contract, by workers in a gas or water supply industry, if it were known to the worker that such action either alone or in combination with others would deprive the consumers of their supply. This provision was later extended in 1919 to electricity undertakings. Similarly, breaches of contract where it was known to the worker that they would endanger human life, or cause serious bodily injury, or expose valuable property to destruction or serious injury, also rendered the person or persons committing the breach liable to prosecution. This section, too, has been extended (1927) to employees of a local or other public authority.
- (b) *Employers and Workmen Act 1875*. This Act dealt with disputes arising out of breaches of contract between employers and workmen, and allowed the Courts to adjust claims for wages or damages or to order the performance of a contract.
- (c) *The Trade Disputes Act 1906*. This Act provided protection for the trade unions, as the House of Lords in the "Taff Vale" judgment 1901 had held that :

- (i) a trade union could be sued in respect of injuries purposely done by its authority and procurement, and
- (ii) a registered trade union could be sued in its registered name.

The Act laid down that a trade union could not be sued for an alleged wrongful act committed by it or on its behalf. Other provisions extended the scope of peaceful picketing, and Section 3 of the *Conspiracy and Protection of Property Act 1875* was further extended by the provision that any act done in pursuance of an agreement or combination by two or more persons, if done in contemplation of a trade dispute, shall not be actionable unless the act if done without agreement or combination would have been actionable.

- (d) *The Trade Union Act 1913*. This empowered the trade unions to levy their members for political purposes.
- (e) *The Trade Disputes Act 1927*, now repealed, which *inter alia* rendered illegal any trade dispute designed or calculated to coerce the Government either directly or indirectly by inflicting hardship on the community.

Trade Union Structure.

Trade Unions were common in the eighteenth century long before the Industrial Revolution, but although they caused strikes on occasions and sometimes, having secured recognition, negotiated collective agreements, the sense of class consciousness which permeates the trade union movement to-day did not then exist. Trade unionism in the sense in which the term is now understood was born in the troubled days of the French Wars and the Industrial Revolution, and has come to mean something different from the legal definition as laid down in the *Trade Union Acts* of 1871, 1876, and 1913.

These define a trade union as any combination whether temporary or permanent, the principal objects of which are under its constitution Statutory objects; provided that any combination which is for the time being registered as a trade union shall be deemed a trade union as defined by this Act, so long as it continues to be so registered. "Statutory Objects" for the purpose of these Acts means "the regulation of the relations between workmen and workmen, or between masters and masters, or the imposing of restrictive conditions on any trade or business, and also the provision of benefits to its members." Thus it will be seen that employers' associations can be registered as trade unions.

A trade union as usually understood has been defined as

“ a continuous association of wage earners for the purpose of maintaining or improving the conditions of their working lives,” and all have this fundamental purpose.

In general, they may be classified into three groups :

- (i) The so-called Craft Unions—usually the older Unions—which seek to organise all workers in a certain skilled trade or group of trades, and are not concerned as to where their members are employed. Unions of this type are to be found in the engineering and metal-working industries, *e.g.* the Amalgamated Society of Engineers, one of the constituent Unions which in 1922 were formed into the Amalgamated Engineering Union. In recent years, however, mainly as the result of the subdivision of labour and the consequent de-skilling of jobs, it has been the practice for such Unions to open a section for the semi-skilled worker, and during the war years the A.E.U. decided to form a separate section for women workers engaged in the engineering industry.
- (ii) The Industrial Unions which have as their aim the organisation of all workers employed in a single industry, irrespective of their occupation or skill. The National Union of Railwaymen is of this type, and its activities have been extended to the Railway Workshop, where both craft and general workers' Unions are represented.
- (iii) The General Workers' Unions. These, which are of recent formation, attempt to organise and represent the semi-skilled or unskilled worker, who has or requires no special training for the particular class of work in which he is employed. Examples of this type are the Transport and General Workers' Union, and the Municipal and General Workers' Union, both Unions being organised into sections catering for a wide range of industries.

For the purpose of entering into agreements on a National basis the Unions have organised themselves into Federations which may cover a wide geographical area, such as the Mine-workers' Federation of Great Britain; and, similarly, we find a Union entering into federation with other Unions in respect of a part of its membership which may be engaged in a particular industry—for example, the Confederation of Shipbuilders and Engineering Unions, comprising about thirty unions who have members engaged in the engineering industry.

Finally, much of the work of the trades union movement has been centralised in the Trades Union Congress, a body which has been formed to promote the interests of all its affiliated organisations. At its Annual Meeting, delegates from the affiliated Unions decide the general trade policy for the ensuing year, and it is the duty of each constituent Union to keep the General Council of the Trades Union Congress informed of all trade disputes, particularly where they may involve directly or indirectly large bodies of workers.

Linking the Trade Unions with the political side of labour there are the Trade Councils and the National Council of Labour, which is a joint body composed of representatives of the General Council of the Trades Union Congress, the Labour Party, the Parliamentary Labour Party, and the Co-operative Movement, and is responsible for consideration of questions which have both an industrial and political implication.

Employers' Organisations.

These fall broadly within three groups :

- (1) Those formed for dealing with industrial relations and concerned with negotiations with the trade unions.
- (2) Those fulfilling this purpose, but also concerned with matters of trade.
- (3) Those which are only concerned with trading activities.

While employers' organisations have been in existence in this country since the Middle Ages, they were mainly concerned with trade and it was not until after the repeal of the *Combination Acts* 1799–1800, and the consequent growth of the trade unions, that organisations of employers increased in numbers and expanded their activities.

Employers' organisations vary in respect of structure, but generally they are organised as regards industrial relations on an "industry" basis. Some are purely local organisations usually dealing with a section of industry; others, however, are national in scope and are concerned with the whole industry. In many of the important industries there are local organisations combined into National Federations—such as the *Engineering and Allied Employers' National Federation*—and before the war there were about 300 National Federations concerned with industrial relations, and approximately 2,000 local organisations.

In 1919 was formed the national *Confederation of Employers' Organisations*, having as its object the ensuring of the co-operation of the employers' National Federations in dealing with the problems of industrial relations; later its name was changed to the *British Employers' Federation*. It can be regarded as being the counterpart of the *Trades Union Congress* in dealing with labour questions generally for the Employers' Organisations.

Both the *British Employers' Federation* and *Trades Union Congress* have been recognised as the authoritative means of

consultation with the Government Departments, and at the outbreak of the war a *National Joint Advisory Council*—consisting of fifteen members of each organisation—was set up. Later the Council appointed a *Joint Consultative Committee* of fourteen members to advise the Minister of National Service on all matters affecting labour and industry during the national crisis.

WAGES

Many of the most difficult problems in industrial relations have their origin in the determination of wage rates, and these are frequently the main cause of many stoppages of work. While to the management wages are merely one of the factors of production (albeit a very important one), to the individual worker the size of his wage packet determines his standard of life and to a great extent his attitude towards the job and the management.

Since the middle of the nineteenth century the methods and machinery of wage determination have undergone fundamental changes. At first, the wage paid was a matter for bargaining between the individual worker and the employer; and in the latter years of the last century rates were generally paid by reference to those paid in similar industries; for not only was the difference between the rates of pay for skilled and semi-skilled workers rigidly adhered to, but a rise in one industry was usually a signal for a similar increase in other industries. To-day, except in certain instances where statutory wage-fixing machinery has been set up, wage bargaining is a matter for collective agreement between associations of employers and the trade unions, and with the fixing of wage rates on a national basis such bargaining must be considered as one of bilateral monopoly—that is, a monopoly of workers on the one hand negotiating with a monopoly of employers on the other. Whereas under pure competition a wage rate would be determined at a single point according to the conditions of supply and demand, under bilateral monopoly there is a range of indeterminateness within which the wage rate will ultimately be fixed. For example, there will exist a certain maximum rate above which the trade unions would not wish to go for fear of the possibility of a trade depression with its consequent unemployment, and also a certain minimum rate below which

the employers would not wish to press wages because of the future supply of labour becoming insufficient for their needs.

In practice there is a further point to be taken into account, for in considering their respective future action in the event of a failure to agree, each party will reflect that if a strike or lock-out takes place the cost will be so much and the terms obtained after the dispute has been settled such and such. Therefore, each party will have in mind a wage rate which it would be to its advantage to negotiate rather than become involved in a dispute. When the minimum rate which the trade union would accept rather than bear the cost of the strike is lower than the maximum rate which the employers would be prepared to offer rather than have a stoppage of work, there will exist a range of practical bargains and the wage rate will be fixed at any point within this range according to the respective bargaining strength of the parties.

For example, assuming :

- (1) That the maximum rate of wages demanded by the trade unions is £5 weekly.
- (2) That the rate that the employers would be prepared to pay rather than risk a stoppage is £4 15s. weekly.
- (3) That the rate below which the trade unions would call a strike, taking into account the estimated cost of a dispute is £4 5s. weekly.
- (4) That the minimum rate which the employers would be prepared to pay and below which they would not push for fear of a fall in the future supply of labour is £4 weekly.

then (1) and (4) are the points constituting the range of indeterminateness; and (2) and (3) the points constituting the range of practical bargains within which the rate will ultimately be fixed.

On the other hand, assuming :

- (1) That the maximum rate demanded by the trade unions is £5 weekly.
- (2) That the rate below which the trade unions would call a strike, taking into account the estimated cost involved, is £4 15s. weekly.
- (3) That the rate the employers would be prepared to pay rather than risk a stoppage of work is £4 10s. weekly.
- (4) That the minimum rate which the employers would be prepared to pay and below which they would not push for fear of a fall in the future supply of labour is £4 weekly.

then (1) and (4) are the points constituting the range of indeterminateness, there would be no range of practical bargains between points (2) and (3), and therefore a dispute would be inevitable.

Sliding-Scale Systems.

Before considering systems of wage payments regulated by reference to output, some mention should be made of the so-called "sliding scale" systems, the best known of which are (a) those under which wage adjustments are made by reference to changes in the selling price of the product, and (b) those under which wage adjustments are made with reference to changes in the price of certain commodities as ascertained by cost-of-living index figures compiled by the Ministry of Labour and National Service.

The former system—whereby wage rates fluctuate in accordance with changes in the selling price of the product—operated in the iron and steel industry prior to the war. Changes in the selling price of iron and steel were ascertained by independent accountants, and wages were regulated in accordance with a scale previously fixed by agreement between the employers and the trade unions. The system, however, has certain disadvantages in that :

- (a) the workers have no incentive to keep down costs of production where the product is in great demand, or where demand remains constant irrespective of price changes, and
- (b) the price of the product may not reflect changes in the cost of living, and therefore real wages may vary as much as ever if the price of the product is not representative of the prices the workers have to pay for consumer goods.

In the latter system, wage rates are varied in accordance with fluctuations in the cost-of-living index figures, and prior to the war wages were regulated by this means in a great number of undertakings, such as the Civil Service, the boot and shoe industry, railways, and the woollen industry.

The principal drawbacks of the system are that :

- (a) in any industry wages must ultimately depend on the value of the product and market conditions, and neither of these varies with the cost-of-living index ;
- (b) the basis on which the cost-of-living index figures are compiled has been the subject of a great deal of criticism. It is held that, in view of the changes taking place in the workers' standard of living, the list of commodities used and the system of "weighting" are not truly representative of the workers' real expenditure. Prior to the war, in 1938, a committee of enquiry was set up to examine in detail the existing cost-of-living index and its method of compilation, and certain recommendations were made which have had to be deferred until more normal conditions prevail.

Job Analysis and Evaluation.—Recently it has been recognised that, apart from differences in the individual merit of employees, jobs require the exercise of different degrees of skill, and that working conditions vary from job to job. For example, differences exist in the skill required in the operating of a single or a double action press, and similarly in the working conditions of indoor and outdoor labourers. Consideration has, therefore, been given to the analysis of job requirements and the drawing up of job descriptions. Jobs are then evaluated in relation to each other either by means of a point system or by a factor comparison method. While there remains much to be done in this connection, and the trade unions have yet to accept its underlying principles, job evaluation can be of the greatest value in selection and training in view of the urgent national need for a general improvement in the level of effectiveness of the total industrial effort.

Generally, wage payments are calculated by reference to :

- (1) Time-Work Rates.
- (2) Piece-Work Rates.
- (3) Premium Bonus Rates.

Time-Work Rates.—The most common method of wage calculation is that based on time, that is, rates paid by the hour, day, or week in respect of a specified number of hours. These, when fixed—usually by collective bargaining, or in some cases by Statutory Wage Fixing bodies—become applicable to all the members in each grade of workers to which they apply, despite the existence of individual differences. In theory, a time-work rate is a minimum wage rate based on the marginal productivity of the last worker that an employer would consider it worth his while to employ, there being no incentive to take on an additional man because the wage of the last man is just covered by the value of the product which is due to his effort. In practice (because of the existence of other forces, such as tradition, custom, and the range of practical bargains, which influence the determination of wages), the rate is a minimum wage rate based on the productivity of the average worker. The rate does not preclude the payment of differential rates for individual merit. For example, in the engineering industry certain employees are sometimes rewarded by payment of *1d.* or *2d.* an hour above the standard or shop rate. Sometimes such merit money is paid in respect of a group of workers,

when it is called "merit money commonly applied," but in the strictest meaning of the term merit payment should apply only to the individual.

Time rates are usually paid where quality rather than quantity of output is the dominating factor, or where it would be difficult to determine with any degree of accuracy the output of a worker. Time rates also form the basic rates of any incentive scheme, and this is usually preferred by the trade unions on the ground that the worker should be assured of certain minimum earnings. The chief disadvantage of time-work rates is the fact that no incentive is offered to the worker reasonably to increase his output, and consequently the responsibility of supervision to stimulate the performance of the worker is increased, but may still be ineffective. Furthermore, the system tends to obscure the relationship between output and payment.

Piece-Work Rates.—As already observed, standard time rates fail to take into account differences of ability and effort, and therefore fail to encourage the average worker fairly to give of his best. As a result, attention has been given to piece-work forms of wage payment which recognise differences in the effectiveness of effort made by individual workers, and reward them accordingly.

At first such forms of wages payment were strongly opposed by the trade unions, but reliable safeguards have been discovered and in general piece-work rates are officially accepted, although occasionally there is opposition from rank and file members. In some large industries, where conditions are most suitable for piece-work, it has been generally adopted on suitable jobs and is preferred by the workers.

Experience has proved that piece-work rates, fairly set by reference to the unit of work, form the most reasonable way of measuring the effectiveness of effort made by the individual worker, or by a group, especially on jobs where slackness is difficult to detect; but their application calls for the most careful consideration lest in practice they result in unfairness to the worker and have therefore to be revised. The safeguards which are applied include a guaranteed basic time rate for the period of the job, and provision is made for ensuring that a worker of average ability shall be enabled fairly to earn an agreed additional percentage of the time rate.

Piece-work rates have been criticised by many students of industrial relations, some of whom have gone so far as to declare that there is no place in industry for the payment of such rates, and that this form of payment will eventually disappear as management becomes aware of its limitations. These include :

- (1) The difficulty of applying piece-work rates where the work is of an intermittent nature, or where delays occur which are beyond the control of the worker.
- (2) Where the quality of the work is an important factor, increased supervision and more detailed inspections are necessary, thus increasing appreciably the ratio of indirect to direct costs.
- (3) The application of piece-work rates is a constant source of friction between employers and workers, although perhaps this is mainly due to suspicion on the part of the workers that rates will be cut when earnings increase above that level which the management regards as equitable. Consequently there will be a tendency for the workers—fearing a readjustment of rates or a further speed-up—to work more slowly, and as a result the standard of morale in the group or in the works remains low.

Fortunately, this practice of rate-cutting by unenlightened employers has fallen into disuse, and any agreement for the fixing of piece-work rates now usually contains a provision to the effect that rates shall not be altered unless there is a radical change in methods. In the engineering industry, for example, it is laid down by agreement between the trade unions and the Engineering and Allied Employers' Federation that there shall be no change in piece-work prices, bonus payments, or basic time rates once established except in the following cases :

- (a) where there has been a mistake in the calculation on either side ;
or,
- (b) where there has been a change in the material, methods of production, or quantities ; or,
- (c) where there has been a mutual agreement between the employers' and workers' representatives, as is the case when a new price is agreed.

Sometimes, especially in those cases where it is difficult to apply an individual piece-work rate in the performance of a particular job, collective or group piece-work rates—such as the “fellowship bonus” system—are applied so that such payment reflects the efforts of the group. It is worth while considering whether such payment of group piece-work rates promotes a sense of responsibility among the group, and whether self-discipline is one of its effects.

Premium Bonus Rates.—Difficulties in the operation of straight piece-work rates led to the consideration of some form of differential or premium bonus rates. The two most common systems of premium bonus payments in Great Britain are the Weir and the Rowan systems. In both systems the reward paid to the workers is based on the amount of time saved; a certain time is fixed for the completion of any piece of work and a proportion of the difference between the actual time taken and the time fixed is credited to the worker.

Unlike straight piece-work, in the premium bonus system the wage payment per unit is not constant, and has the advantage of offsetting to some extent any difficulties that might arise from bad rate-fixing in the first instance.

In the Weir system, the usual proportion credited to the worker is one half of the time saved, and this is paid to the worker in addition to the actual time taken. For example, assuming the time allowed for the performance of a job to be 100 hours, and the actual time to complete it 80 hours, payment would be made for 90 hours, that is, the actual time taken plus one-half the difference between that and the time allowed.

In the Rowan system a specified time is allowed for the performance of a certain job, say 100 hours. Assuming it to have been completed in 80 hours then wage payment will be made according to the following formula :—

$$\text{TIME TAKEN} + \frac{\text{TIME TAKEN}}{\text{TIME ALLOWED}} \times \text{TIME SAVED}$$

Other Forms of Incentive.*—The best known of these are Profit-sharing and Co-partnership.

Profit-sharing is in essence an arrangement to distribute to the personnel concerned a part of the profit earned by the business. Since so many factors, which have little direct relation to the efforts of process workers and their supervisors enter into the earning of profits, and the results are usually only ascertained yearly, the appeal to workers having an uncertain tenure of employment is not very marked. Amongst the more responsible personnel the position is different; because the ramifications of the business are more within their knowledge and observation, and they can see better that they are acting as one team. It makes, therefore, a strong appeal to them

* See p. 223.

if they are admitted to a share of the profits of the business. The argument that profit-sharing ought to carry with it loss-sharing is misleading, if the basic or guaranteed remuneration of the personnel in question is a minimum, and if therefore any share of profits is comparable in principle with that of the extra pay of the piece-worker or the commission of the salesman.

Co-partnership involves a binding together of personnel that sounds attractive enough in principle but not to the trade unions, which for the most part seek a different form of solidarity. The difficulties of its application lie principally in the vicissitudes of trade. There are other difficulties that arise in part from lack of confidence between the employer as such and the workers as members of an outside organisation (the trade union), which claims a definite external allegiance.

The chief advantages which are claimed for co-partnership, from the point of view of the improvement of industrial relations, lie in the co-operation called for on the part of the employees and employers, and the granting to the employees of an insight into the workings of the business which, under normal conditions, they can seldom obtain. An understanding of the financial and other little known conditions of the company on which they depend for their livelihood should, and often does, inspire in the employees a desire to achieve the highest possible degree of efficiency in the conduct of its operations. The possession of some voice in the direction of its affairs through their own elected director, may help to inspire that confidence which is the key-note of sound industrial relations : the experience of the South Metropolitan Gas Company notably supports this view. These features, rather than any increase in actual remuneration which co-partnership may make possible, constitute the most satisfying part of such schemes.

It is questionable whether co-partnership should be considered merely as an incentive. To many it is an ideal, founded upon the principle of collective responsibility. There is, for example, the co-operative enterprise. In this, the nature of the organisation is similar to that of the joint stock company, except that its shareholders are also its customers and receive dividends in proportion to their purchases. This more intimate relationship means that, to a certain extent, the shareholders can decide whether they will receive the benefits that should result from large-scale organisation and efficiency in the form of high profits on shares, or cheap prices of commodities, or both.

As an alternative to starting a new undertaking which may or may not turn out to be a success, there is the possibility of acquiring all or a majority of the shares, and thereby the control, of an established and successful Company (1) by normal purchase through the ordinary channels, or (2) by some *ad hoc* arrangement appropriate to the special conditions of a given case and mutually agreed on by the parties.

Fundamentally, a nationalised industry is an example of co-partnership. It is evident that ere long the man in the street, the ship, and the mine, in the office, the field, and the factory will be a co-partner in a growing number of such industries, whose destinies, and that of this country, are in his hands. Later he will realise that compulsory acquisition of great and complex undertakings is a much simpler matter than their efficient running, over which he has far less statutory control than shareholders may exercise over the management of their companies. But it is up to him as a matter of urgency to realise from the start the implications of his ownership, to shoulder his responsibilities, and to help make nationalisation efficient by "delivering the goods" through informed, conscientious, objective, and sustained effort.

COLLECTIVE BARGAINING AND JOINT NEGOTIATION

Collective Bargaining, in which conditions of employment in an industry are determined by negotiation between representatives of the workers on the one hand and of one or more employers on the other, has been of slow but continuous growth. Encouraged by the State for over seventy-five years, it is distinctly a development of the Industrial Revolution and relies for its strength mainly on the organisation of workers and employers into voluntary associations whose representatives have authority to enter into agreements which are morally, if not legally, binding on the constituent members. Almost without exception such agreements have been honoured in all trades, and collective agreements have for many years been entered into respecting a great variety of matters such as piece-work prices, holidays, apprenticeship schemes, and working conditions generally, in addition to hours of work and wage rates.

As is the case with the trade unions and employers' associations, the joint arrangements set up in respect of different industries show great variety both in structure and organisation, this being mainly due to such factors as the geographical

distribution of industry, the extent to which the workers in an industry are organised, and the terms of reference of the negotiating bodies. Similarly, the extent to which agreements apply may vary according to the industry. In the early days of the trade union movement, agreements were usually concerned with matters of a local nature, but gradually they have become national in their application. Nevertheless, full national uniformity has not been achieved, and often wages and working conditions in an industry may vary from district to district, as is the case in building or engineering.

The Conciliation Act 1896.

Side by side with the development of collective bargaining and the setting up of joint negotiating machinery, the State (on the ground that a stoppage of work might inflict hardship on the general community) has given its attention to the creation of government machinery to assist in the settlement of disputes, and in 1896 the *Conciliation Act* was passed. The Act empowered the President of the Board of Trade to :

- (a) Enquire into the causes of, or the circumstances of, any trade dispute in being, or which might be threatened.
- (b) Consider ways and means of bringing about a settlement.
- (c) Appoint conciliators or conciliation boards if application be made by either of the parties.
- (d) Appoint arbitrators if application be made by both parties.
- (e) Set up a special section of the Board of Trade to encourage the further development of voluntary negotiating machinery.

The operation of the Act was purely voluntary, and this was at once its strength and weakness ; for while it avoided the failure, through fear of coercion, of earlier attempts by the State to assist conciliation, many considered it to be inadequate in view of the fact that many of the larger employers refused to recognise organisations of workers for purposes of negotiation. The Act was not, therefore, used to any great extent, and the increase in disputes showed the necessity for further Government assistance in their mitigation.

The Industrial Council.

In 1907, the Board of Trade was forced to intervene in a railway dispute, and set up standing arbitration and conciliation boards for each grade of railway workers throughout the country ; and in 1911 an Industrial Council was set up to consider and enquire into any matter concerning a trade dispute which might be reported to it. Until the passing of the *Munitions Act* 1915, which attempted without a great deal of

success to introduce compulsion in the settlement of disputes, much useful work was done by the Council.

The Whitley Committee.

As a result of the many industrial disputes which, despite the provisions of the *Munitions Act* in respect of compulsory arbitration, took place during the First World War, the Government set up a Committee under the Chairmanship of Mr. J. H. Whitley, M.P., then the Speaker of the House of Commons, to consider the whole question of industrial relations. Its terms of reference were :

- (a) To consider and make suggestions for bringing about improvements of a permanent nature in the relationship between employers and workers.
- (b) To recommend means for securing that industrial conditions affecting the relationship between employers and workers shall be systematically reviewed by those concerned, with the object of improving conditions in the future.

In 1918 the Committee published its Reports, and stated that in its opinion :

- (a) Compulsory arbitration was not only unacceptable to the parties concerned in a dispute, but it also failed to prevent strikes.
- (b) The further encouragement of voluntary conciliation and arbitration was desirable.

The Reports—five in number—included the following recommendations :

- (1) That Joint Industrial Councils be set up in well-organised industries.
- (2) That Works Committees representative of both Managements and Workers be set up in industrial establishments. The members of these Councils and Committees were to meet regularly and on an equal footing to consider matters of mutual interest, and not merely as employers and workers after a dispute had arisen. Joint Councils were to be concerned with such matters as health, management, legislation—in fact, everything appertaining to the daily life of the workers. Works Committees were to be concerned with questions of local application, thereby eliminating the possibility of disputes through undue delay.
- (3) The Statutory regulation of wages and conditions in industries in which the workers were badly organised. (In this connection an increase in the number of trade boards set up under the *Trade Boards Act* 1909 was recommended.)
- (4) The establishment of a permanent *Court of Arbitration*.
- (5) That the Minister of Labour be empowered to hold enquiry into a trade dispute.

These recommendations were received favourably by organisations of both employers and workers, and to-day form the basis of our industrial relations.

The Industrial Courts Act 1919.

As a result of the recommendations of the Whitley Committee, Parliament passed the *Industrial Courts Act*, which (extending the scope of the *Conciliation Act 1896*) provides :

- (a) That the Minister of Labour be empowered to set up a permanent Industrial Court consisting of three panels, representing the employers, the workers, and the general public.
- (b) That in the event of a dispute, the Minister may at the request of either party, and with the consent of the other, refer the matter to :
 - (1) The Industrial Court ; or,
 - (2) Arbitration by one or more arbitrators appointed by the Minister ; or
 - (3) A specially constituted body.
- (c) That the Minister may, on his own initiative, set up a Court of Enquiry which can compel evidence to be given on oath, and make recommendations to him.

Like other statutory tribunals whose decisions are not binding on the parties in dispute, the Court may be called upon to make decisions incompatible with the broad principles which it normally follows, namely :

- (i) That wage rates must be such as to provide for the minimum needs of the workers in the industry.
- (ii) That wage rates must be what are considered " fair " in relation to those paid in other industries.
- (iii) That wage rates must bear some relation to the prosperity of the industry.

For example, the Court has had occasion to recommend certain wage rate increases, on the grounds of prosperity, in a certain industry ; and later, on the grounds of " fairness," has been obliged to recommend a wage increase in another industry, although the prosperity of the industry failed to justify the recommendation.

Joint Industrial Councils.

Between January 1918 and December 1923 over seventy Joint Industrial Councils were set up, some of which have played an important part in the settlement of industrial disputes. Many of them make provision in their constitution for all disputes to be referred to the Council before any stoppage of work can take place, and all show a much greater conformity in the structure and organisation of the negotiating machinery set up than those of the joint negotiating bodies set up, as a result of collective bargaining, prior to this time.

Among the matters dealt with by these Councils, other than the regulation of time and wage rates, are education and training, apprentices, welfare facilities, health, safety measures, transport, and research, including the compilation of statistics. In all these matters there may be consultation with the Government Department concerned.

Works Joint Consultation.

Joint Consultation as understood to-day is entirely different from that existing before the First World War. Prior to that time there were few joint bodies for consultation between management and workers, and such Works Committees as existed were in the main composed entirely of workers' representatives who met the management in connection with complaints and grievances. That war, however, with the demand for increased production, stressed the need for consultation between management and workers, and a considerable increase took place in the number of Committees of a joint character. After that war, as a result of the Whitley Committee's Reports, Works Committees on the Whitley model were set up in many industries. Usually they were not concerned with wages and working conditions, these being the subject of discussion by the Joint Industrial Councils at national or district level; and many of these Committees, particularly those not concerned with wages, achieved considerable success.

The idea of joint consultation received some support in the better organised industries; and committees, although not always conforming to the Whitley models, were set up, primarily for the settlement at workshop level of matters arising out of the application of agreements entered into by the trade unions and the employers. In 1922 there was an agreement between the Amalgamated Engineering Union and the Confederation of Engineering and Allied Employers for the setting up of Works Committees in the engineering industry. The agreement reads :

“ A Works Committee may be set up in each establishment consisting of not more than seven representatives of the management and not more than seven shop stewards, who shall be representative of the various classes of work-people in the establishment. The shop stewards for this purpose to be nominated and elected by ballot of the work-people, members of the trade unions parties to the agreement, employed in the establishment.”

Nevertheless, not more than one per cent. of Companies employing more than one hundred persons set up a Joint Consultative Committee as defined, and in the great majority of Companies outside the Confederation, Joint Consultative Committees were not even contemplated.

Joint Consultative Committees.

It was not until 1942, when the stresses and strains of war production had again shown the need for joint consultation, and the lessons of 1914-18 had been re-learned, that the principle of joint consultation was widely adopted. In that year there was an agreement for the setting up of Joint Production Committees in the ordnance factories, and the seal of official approval was set on the principle of joint consultation in the engineering industry by the signing of an agreement between the Engineering and Allied Employers' Federation and the Unions concerned for the setting up of Joint Consultative Committees.

In industry to-day, Joint Consultative Committees (Works Committees, Works Co-operation Committees, Joint Committees, Joint Production Committees, Pit Production Committees, Staff Co-ordination Committees, Yard Committees) play an important part in the day-to-day management of an undertaking; and during the war years, under the *Essential Work (General Provisions) Order*, they considered cases of alleged absenteeism or persistent lateness where in the opinion of the National Service Officer of the Ministry of Labour and National Service such a Committee was an "appropriate Committee."

Shop Stewards.

Perhaps the most significant single development in industrial relations during the First World War was the growth of the shop stewards movement, particularly in the engineering and allied industries. The shop steward or his equivalent was formerly a minor official of his trade union, and in most cases his functions were of comparatively little importance, being usually concerned with periodical inspection of union cards and reporting to the district committee of the trade union on matters affecting the trade.

As a result of the legal prohibition of stoppages of work,

and the acceptance of compulsory arbitration imposed by the Government during the First World War, there developed areas of unrest throughout the country, which seem to have arisen from the activities of what has been called the shop stewards movement. This had as one of its aims the devolution of authority to workshop level, and gained impetus from the restrictions placed on the recognised authority of the trade unions in respect of strike action. In consequence, its adherents were able to persuade the average worker that he could expect nothing in that direction from his trade union official and must therefore act for himself. The formation and activities of the movement compelled the unions to recognise the shop steward as an essential element in workshop negotiating procedure; and to-day provision is generally made for the shop steward to act as representative on behalf of the workers in his shop or section, and individual grievances and complaints are usually taken up by him.

A shop steward of either sex is elected by the trade unionists in a "shop" or section of the works to be their own immediate representative and spokesman in matters which they may wish to take up on the spot with the representative of the management who is in charge of that shop or section. In each industrial establishment where the shop stewards procedure is recognised, there is usually elected a Shop Stewards' Convenor who, although officially only a co-ordinating secretary of the shop stewards in that establishment, in practice acts as their representative in contacts with the higher management which are of wider significance or on a higher level than the day-to-day details peculiar to any one shop. A Shop Stewards' Committee is usually set up; and (though without official status) by virtue of the fact that workers' representatives on Joint Consultation Committees are normally shop stewards, and by the influence which the Shop Stewards' Committee wields in the election of such representatives, it is in fact often responsible for formulation of the policy to be submitted by the employees' representatives for discussion at any particular meeting of a Joint Consultation Committee.

Wartime Legislation.

Briefly, it may be said that on the outbreak of war the Government considered the question of war production being

impeded by strikes, and the disturbing effects of inflation on wage levels. With regard to the latter, it was decided to leave the negotiation of wages and conditions of work to be dealt with through the existing joint negotiating machinery. As to the former, it was recommended by the Joint Consultative Committee set up in May 1940 by the National Joint Advisory Council to assist the Minister of Labour and National Service, that the Minister be empowered to make orders for prohibiting, subject to the provisions of the Orders, a strike or lockout in connection with any trade dispute.

The Conditions of Employment and National Arbitration Orders 1940-42.

These Orders provided for the setting up of a *National Arbitration Tribunal* composed of five members—three appointed members (one of whom was the Chairman) together with two others, one of whom was a representative of the workers, the other of the employers. Members were selected from three panels—one of appointed members, the other two of representative members—constituted by the Minister after consultation with the *Trades Union Congress* and the *British Employers' Confederation*.

In the event of a trade dispute either party could report it to the Minister. The report had to be in writing, and the dispute must have been referred for settlement to any joint negotiating machinery existing in the industry. Should no settlement be agreed, the matter had to be reported by the Minister to the *National Arbitration Tribunal* within twenty-one days from the date the dispute was reported. Lock-outs or strikes were prohibited unless the dispute had been reported to the Minister, and had not been referred by the Minister for settlement within the twenty-one days laid down.

Furthermore, all employers were required by the Order to observe terms and conditions of employment not less favourable than "recognised terms and conditions" in the industry.

Restoration of Pre-War Trade Practices Act 1942.

This Act lays down that where trade practices obtaining immediately before the war have been departed from in an undertaking during the war, the employer must within two months of a date to be appointed by the Minister, as being the

end of the war period for the purposes of the Act, restore or permit the restoration of the practices and continue such practices for not less than eighteen months. In 1940 it had been arranged for employers and the Trade Unions to deposit at the local office of the Ministry of Labour and National Service, particulars of trade practices and departures therefrom.

From the foregoing discussion it will be apparent that means which can be, and are, employed to further industrial harmony are extremely varied. Acknowledgment deserves to be made of the contributions to this cause rendered by the *Industrial Welfare Society*, the *Institute of Personnel Management*,* and the *National Institute of Industrial Psychology*. Not every experiment has been successful; and existing methods are subject to periodic modifications in the light of present conditions and sometimes temporary exigencies. Yet in this field of endeavour it is the intention which is of first importance: the means adopted to implement the intention must always represent a compromise between the ideal and the practicable.

Leaders of thought in Parliament, among Industrialists and in the Trade Unions, all emphasise the necessity for increased production at reasonable cost to raise the standard of living and to enable the necessary volume of exports to be attained and maintained. In this connection prominence is given to the question of incentives. It is increasingly believed that though there is something to be said for financial incentives, in this country they tend occasionally to defeat their own object; that while nothing short of the best working conditions and management methods should obtain, beyond this point sustained output at a reasonably satisfactory level will depend upon subjective states of thought and feeling, as witness the Hawthorn experiment; and that perhaps the most decisive factors will prove to be the understanding, by everyone concerned, of the proper objectives of industry and of the best methods of attaining them, and recognition and acceptance by each worker in every grade—from the Chairman to the youngest recruit—of individual responsibility for the contribution which he is in a position to make.

* Formerly *The Institute of Labour Management*.

Understanding of those objectives and methods depends to an important degree upon enlightenment through freely available knowledge, objective, unbiased, and untainted; and it has been suggested that a valuable public service would be performed if whole industries, and not merely some of their individual member firms, were to adopt suitable schemes of further education for all their employees, based on a sound preliminary general education—somewhat on the lines of that put forward by H. W. Broadbent.⁴¹

In reviewing past progress and present achievement, it is necessary to remember that in industrial relations, as in all other human relationships, finality can never be reached. Changing conditions in a changing world must continually react on these relationships; and, while the ideal of industrial harmony remains unchanged, the machinery of negotiation and co-operation will continually develop.

CHAPTER IX

OUTLINE OF INDUSTRIAL LEGISLATION

Industrial Law is the outcome of a desire to protect those in employment whose position makes them unable to protect themselves. Opinions may still differ as to how far such protection should go ; but the application of the law has either itself instigated, or followed, the growth of the public conscience in regard to the physical and social conditions under which industry should be operated. The difficulty that British employers have is to comply with the increasing requirements of the law, and still meet competition from countries where less guarded conditions of production obtain. Presumably there would be less probability of this handicap remaining effective if output increased in proportion to improvements in working conditions : this will certainly not be automatic, and such increase as may be possible will depend to an important degree on the growth of goodwill in improved conditions. The student will find that the study of industrial legislation provides him with a great deal of knowledge as to how a factory ought to be planned and equipped in the best interests of the business.

INDUSTRIAL legislation, sometimes referred to as Labour Law, might, having regard to its range, be better described as Employment Law. This title fits in with the inclusion under this head of a reference to the law relating to contracts of service between employer and employed ("Master and Servant" in the older phraseology). The range of legislation that is briefly reviewed in this chapter falls under five headings :

Terms of Engagement ;
Conditions of Employment ;
Wages ;
State Insurance ;
Compensation for Injuries.

Legislation connected with Industrial Relations has been referred to in the previous chapter.

All industrial law may be said to be aimed at protecting

the employee to a degree that the law otherwise either does not provide, or, if it does, provides only by recourse to legal action on the part of the individual suffering injury or damage. Legal proceedings tend to be prohibitive in point of cost in time, money, and unfortunate reaction on the future standing of the employee. The employee may still have to institute legal proceedings under the statutes that embody industrial law, but procedure is simplified where it is necessary at all. One of the valuable services of a trade union to its members is to act as adviser on their legal rights; and, for the most part, any infringement by an employer or his agent is willingly rectified on attention being drawn to the error.

TERMS OF ENGAGEMENT

These should make clear for what period and to what extent wages and salaries shall be paid during absence on account of illness. There is rarely any concession on this point to process workers, but as they are insured persons under the *National Insurance Act 1946*, they can claim sick benefit. With employees at a salary or "upstanding" wage, who are also insured persons, it is for the terms of engagement to lay down whether they must suffer reduction of any State Insurance benefit to which they are entitled during such time as the employer continues to pay them: such an arrangement is not inequitable. For Salesmens' Agreements see page 143.

In general, terms of engagement, or service agreements, are based on Common Law or right rather than on Statute Law. In *Elements of English Law*, by W. M. Geldart,¹⁹ the contrast between Common Law and Statute Law is stated as being roughly between unwritten law and written law. He says, for instance, that no statute "prescribes in general terms that a man must pay his debts or perform his contracts or pay damages for trespass or libel or slander. The statutes assume the existence of the Common Law," and, again, "Where Statute Law and Common Law come into competition, it is the former that prevails. Our law sets no limits to the power of Parliament." One of the dominant features in service agreements is the matter of trade custom or practice common in the industry in question.

Agreements may be either expressed or implied, verbal or written, or partly verbal and partly written: and where, from their nature, they are incapable of being entirely carried out by either party within a year, they must be in writing.

It is customary for the terms of service by process workers to be agreed between the respective Trade Union and Employers' Federation. Where trades are not sufficiently organised for this voluntary arrangement to be relied on to protect the workers, Trade Boards have been set up under the *Trade Boards Act 1909 and 1918*, as is explained later (page 295).

A Service Agreement, however reached, being a contract, is subject to the general considerations set out in Chapter I, Vol. I, as to contract conditions and breach of contract. An important point to be borne in mind in the administration of industry is that the adequate publication of works rules constitutes a contract as to conditions of service, and the rules need therefore to be explicit. One main point in regard to the termination of employment by either side concerns the length of notice to be given and how and when it is to be given. In the absence of any express understanding, the presumption is that the notice to be given by either party is not less than the period for which the remuneration is paid—a week's notice for those paid weekly, a month's notice for those paid monthly—and is to be given not later than the time of payment for the current period. Equivalent payment may be made in lieu of notice.

During the Second World War considerable changes were made in the relations of employers and employees, and a few of these are still subsisting at the time of writing. It was then deemed essential to suspend some of the normal conditions of employment. The details were set out in *Statutory Orders* issued in 1940 and 1942, summarised as follows from *Essential Work (General Provisions) Order 1942 No. 1594* dated 6th August, 1942 :

Where the Minister of Labour and National Service considers that the work of an Undertaking is essential for either defence of the realm, the efficient prosecution of the war or to the life of the community, he enters the name of the Undertaking in a Schedule of Undertakings and serves a certificate on the employer. This certificate has to be kept posted in a conspicuous place in the specified premises, and its regulations apply to all employed persons in the undertaking, except those ordinarily working less than 30 hours weekly.

Its main effects were :—

(1) *Concerning employment termination*

- (a) That employment cannot be terminated either by employee or employer without the consent in writing of a national service officer.

(Exception in case of serious misconduct.)

- (b) That not less than one week's notice of termination of the employment shall be given.

- (c) That the normal wage shall be paid during the notice period.

(2) *Concerning terms and conditions of employment*

- (a) That these are not less favourable than those provided for in the *Conditions of Employment and National Arbitration Order 1940*, No. 1305.
- (b) That satisfactory welfare provisions exist.
- (c) That adequate provision exists for the training of workers.

(3) *Concerning absenteeism and persistent lateness*

- (a) That a specified person shall not :
 - (i) absent himself from work
 - (ii) be persistently lateunless in either case he has reasonable excuse.
- (b) That the person carrying on the Undertaking shall report such lateness or absenteeism to a national service officer or to a committee approved by him and that if such officer finds after consideration of the case that the charge is proved, he will issue, under Regulation 58A of the Defence (General) Regulations, 1939, a certificate of the evidence of the facts which will be used to prosecute the person committing the offence.

(4) *Concerning disobedience of lawful orders*, including working reasonable overtime, that the person carrying on the Undertaking may report the facts to the national service officer, who will take steps to ensure obedience or will submit the matter to a Local Appeal Board for its report and recommendation and who may decide to prosecute in extreme cases.(5) *Concerning keeping records for Inspectors*, that the employer is required to keep adequate records and to allow them to be inspected by a representative of the Ministry.(6) *Concerning Guaranteed Wage*, if a person is during the normal working hours

- (i) capable of and available for work ; and
- (ii) willing to perform any services outside his normal occupation which, in the circumstances, he can reasonably be asked to perform during any period *when work is not available for him in his usual occupation*.

Special conditions apply in the case of suspension of work for a period up to three days, for reasons of a disciplinary character ; also in the case of suspension due to an illegal strike, after four days' notice. An illegal strike is one in connection with a trade dispute which is unlawful by reason of the provisions of Article 4 of the *Conditions of Employment and National Arbitration Order 1940*.

The main purpose of this important piece of war-time legislation was to minimise the interruption of work by trade disputes. It provided for the constitution of the "National Arbitration Tribunal," to which unsettled trade disputes could be submitted. It prohibited lock-outs by em-

ployers and strikes by employees, and finally laid upon both parties the obligation to observe terms and conditions of employment then existing in "recognised" industries, adding that the terms and conditions of employment shall not be deemed to be less favourable than the recognised terms and conditions relating to workers engaged in similar work, which had been agreed upon by recognised representatives of both parties or by arbitration. This was a war measure.

Most of the restrictive conditions and provisions have been lifted during 1946; and the remainder, relating to the Control of Engagement, may all be removed within a year. Women have been entirely freed from restriction on engagement (S.R. & O. 1946/832) and men above the age of 31.

Summary dismissal without notice, or payment in lieu of notice, is legal if the employee is guilty of serious misconduct, but under the *Essential Work Order* the dismissal was only provisional in the first instance, but became absolute if neither the employee nor the national service officer decided to take action under that Order. Some of the justifiable grounds of dismissal were:

- (1) betrayal of the employer's secrets,
- (2) acceptance of bribes,
- (3) wilful disobedience of lawful orders.

CONDITIONS OF EMPLOYMENT

The intervention of the State in the control of industrial conditions has been the result of social evolution rather than political—a striving of public-spirited individuals toward the ideal of a better world for the manual or process workers against vested interest and prejudice. Without attempting an historical survey, which space forbids, it is of interest to glance back for a moment.

The development of the Industrial Revolution in Great Britain caused unprecedented changes in the mode of life of a large part of the people. Home industry was supplanted for many by the factory system, which soon gave rise to many abuses—particularly as regards the employment of children—but any attempt at interference with industry by the State to regulate these abuses met with the uncompromising hostility of the employers, while the conscience of the country as a whole was slow to awaken.

Like the growth of all British Law, that of factory legislation has been gradual and piecemeal. The policy of *laissez-faire* in industry, which proved such a formidable obstacle to the early legislators, died slowly—and indeed it may be doubted whether even yet it is quite extinct.

The first Act, aimed at the reform of the “Factory System” and concerned with regulating the hours of working of workers under eighteen, was passed in 1833 as a result of the pioneer work of enlightened men, but it was not until fourteen years later that the *Ten Hours’ Act*, 1847, was passed. The importance of these Acts lies in the establishment of the principle of state inspection of industry. A concise and very interesting review of one hundred years of experience (1833 to 1932) under the Factories Act, was given in the *Report of the Chief Inspector of Factories for 1932*.²⁶

To remedy the state of affairs which the policy of *laissez-faire* permitted, a great number of Statutes and Orders came into existence. These were eventually consolidated into the *Factories Act*, 1937 (the Principal Act), which is the basis of English Factory Law. Since 1937, many amendments and supplements have been added, especially during the Second World War.

The administration of the Principal Act, and of the later amendments and supplements, is entrusted to Factory Inspectors (both men and women) and Examining Surgeons; and the Factory Inspectors carry the burden of securing enforcement of a great deal of Industrial Law. The Factory Inspectors and Examining Surgeons have very full powers. Their duties and powers are detailed in Sections 122 to 125 inclusive of the *Factories Act*, 1937.

This Act (known as the “Principal Act”) is intended to secure safe and healthy working conditions in manufacturing and other operations. It is a considerable advance on the earlier Factory Acts, particularly in the great reduction of permissible working hours laid down in the earlier Factory Acts for women and young persons, and in the regulation, for the first time, of the working hours of some additional classes of workers under 18 connected with factories, such as van boys and errand boys.

The earlier Acts were limited to specified types of business activity, and differentiated between a factory and a workshop, between a textile and a non-textile factory. The Act of 1937 applies generally to all “factories,” which term it defines (section 151) as—

"any premises in which, or within the close or curtilage or precincts of which, persons are employed in manual labour in any process for or incidental to any of the following purposes, namely :

- (i) the making of any article or part of any article ; or
- (ii) the altering, repairing, ornamenting, finishing, cleaning or washing, or the breaking up or demolition of any article ; or
- (iii) the adapting for sale of any article,

being premises in which, or within the close or curtilage or precincts of which, the work is carried on by way of trade or for the purposes of gain and to or over which the employer of the persons employed therein has the right of access or control."

This definition is followed by a list of thirteen classes of premises which also fall within the definition, which should be studied when seeking to gain a full knowledge of the Act of 1937. These classes include such widely varied business activities as open-air premises and places where sorting of articles is carried out as a preliminary to work in a factory ; builders' yards ; gas holders ; shipyards ; vehicle repair works (garages) and film studios.

The State control of industrial establishments during the Second World War led to many extensions of industrial legislation, either by additional statutes or under Orders-in-Council having the same authority. Factories Inspectorate began to assume wider advisory functions, especially in regard to matters covered by the War-time Statutory Rules and Orders.

During the First World War women factory inspectors were first appointed : to-day they rank with men inspectors in every way in point of qualification and responsibility. With the very marked increase of employment of women in industry, this development of the inspectorate has considerably strengthened the forces at work to improve working conditions.

Conditions of employment which are the subject of State regulations may be classified as follows :—

- (a) Health, (b) Safety, (c) Welfare, (d) Employment of women and young persons, (e) General regulations.

These regulations have been so much the care of generations of Factory Inspectors that the official Abstracts²⁵ for Factories, which are required to be posted in every factory, provide a condensed statement of the requirements, and these cannot be improved upon for present purposes. With the permission of the Controller of H.M. Stationery Office, the text which follows is drawn largely from official documents, with

only slight re-arrangement and curtailment. There are special abstracts, not considered here, for Docks and for Building and Engineering Operations. For the purposes of this book, attention can be directed only to the more general requirements which must be complied with by the owner of every factory.

(a) Health.

Cleanliness.—The factory must be kept clean. Accumulations of dirt and refuse must be removed daily from floors and benches; the floor of every workroom must be cleaned at least once a week. Inside walls, partitions and ceilings must

- (1) If they have a smooth impervious surface, be washed with hot water and soap or cleaned by other approved methods every 14 months, or
- (2) If kept painted with oil paint or varnished, be repainted or re-varnished every seven years and washed with hot water, etc. every 14 months, or
- (3) In other cases be whitewashed or colourwashed every 14 months. Particulars must be entered in the General Register for official inspection.

Overcrowding.—The factory must not be overcrowded. In each workroom there must be at least 400 cubic feet of space for every person employed, not counting space more than 14 feet from the floor.

Temperature.—A reasonable temperature must be maintained in each workroom by non-injurious methods. In any room where a substantial proportion of the work is done sitting and does not involve serious physical effort, the temperature must not be less than 60° F. after the first hour. At least one thermometer must be provided in a suitable position.

Ventilation.—Sufficient ventilation of workrooms must be secured by the circulation of fresh air. Where dust or fume likely to be injurious or offensive, or any substantial quantity of dust, is given off, all practical measures must be taken to protect the workers against inhaling it, and, where practicable, localised exhaust ventilation must be provided and maintained.

Lighting.—There must be adequate and suitable lighting in every part of the factory in which persons are working or passing.

Drainage of Floors.—Where wet processes are carried on, adequate means for draining the floors must be provided.

Sanitary Accommodation.—Sufficient and suitable sanitary conveniences, separate for each sex, must be provided in accordance with the standards fixed by the Minister.

Meals in Certain Dangerous Trades.—Persons must not partake of food or drink or remain during meal-times in workrooms where any poisonous substance is so used as to give rise to dust or fume; nor may they remain during meal-times in any rooms in which is carried on any process prescribed by regulations as one which gives rise to siliceous or asbestos dust. Provision must be made to enable persons employed in such rooms to take their meals elsewhere in the factory.

Underground Rooms.—No work may be carried on in any underground room (unless used for storage or other specially excepted purpose) if the District Inspector certifies that it is unsuitable on hygienic grounds or because the means of escape in case of fire are inadequate. Notice must be given to the District Inspector before an underground room is used as a workroom in a factory, and his written consent obtained before it may be used.

Lifting Excessive Weights.—A young person must not be employed to lift, carry or move any load so heavy as to be likely to cause injury to the young person.

Lead Processes.—A woman or young person must not be employed in certain lead processes, or in cleaning workrooms where any of the processes are carried on.

Where women or young persons are employed in any other process which involves the use of a lead compound producing dust or fume, or if they are liable to be splashed with any lead compound

- (1) The dust or fume produced must be drawn away by an efficient exhaust draught;
- (2) They must undergo medical examination as prescribed and may be suspended from further employment in lead processes;
- (3) No food, drink or tobacco may be brought into the workroom;
- (4) Protective clothing must be provided by the occupier and worn;
- (5) Suitable cloakroom, messroom and washing accommodation must be provided as prescribed; and
- (6) All tools and apparatus must be kept clean.

Notification of Industrial Poisoning or Disease.—Cases of poisoning by lead, phosphorus, arsenic, mercury, carbon bisulphide, manganese or aniline; chronic poisoning by benzene; compressed air illness; anthrax; toxic jaundice due to poisonous substance; toxic anaemia; and by special ulceration, must forthwith be reported to the District Factory Inspector and to the Examining Surgeon, and entered in the General Register.

(b) Safety.

Fencing.—Every part of the transmission machinery and every dangerous part of other machinery, and all parts of electric motors, generators, rotary converters and flywheels directly connected to them, must be securely fenced unless in such a position or of such construction as to be as safe to every person employed as if securely fenced; and any part of a stock-bar which projects beyond the head-stock of a lathe must be securely fenced unless it is in such a position as to be as safe to every person as if securely fenced. A male person over 18 may, however, approach unfenced machinery in motion in certain strictly limited contingencies and subject to conditions specified by the Minister.

Moving parts of other prime movers and flywheels directly connected to them, and the head and tail race of a water wheel or water turbine, must be securely fenced irrespective of their position.

Fixed vessels, pits, etc., containing scalding, corrosive or poisonous liquids must, unless the edge is three feet above the adjoining ground or platform, be securely fenced to at least that height or be securely covered. Where this is impracticable, other precautions, as far as practicable, must be taken.

All fencing must be of substantial construction and be maintained in an efficient state.

Other Requirements in Connection with Transmission Machinery.—

Devices or appliances for promptly cutting off the power from the transmission machinery must be provided in every room or place where work is carried on. Efficient mechanical appliances must be provided to move driving belts to and from fast and loose pulleys. Driving belts must not rest or ride on revolving shafts when the belt is not in use.

New Machines.—New power-driven machines must not be sold, let on hire, or used unless certain parts are effectively guarded.

Cleaning Machinery.—A woman or young person must not clean

- (1) A prime mover or transmission machinery while it is in motion,
or

(2) Any part of any machine

if there is a risk of injury from any moving part of that machine or any adjacent machinery.

Training of Young Persons.—A young person must not work at any machine specified by the Minister to be dangerous unless

- (1) He has been fully instructed as to the dangers and precautions, and
- (2) He has received sufficient training in the work or is under adequate supervision.

Protection of Eyes.—Goggles or effective screens must be provided in processes specified by the Minister.

Hoists or Lifts.—Every hoist or lift must be of good mechanical construction and sound material and adequate strength, and be properly maintained. It must be thoroughly examined every six months by a competent person, whose report must be entered in or attached to the General Register.

Every hoistway must be efficiently protected by a substantial enclosure and landing gates, with efficient interlocking or other devices. The safe working load must be marked conspicuously on each hoist. Additional safeguards must be provided on hoists used for carrying persons, whether with goods or otherwise. The requirements are somewhat less stringent in the case of hoists constructed before the passing of the 1937 Act, hoists not connected with mechanical power, and continuous hoists.

Every teagle opening or similar doorway used for hoisting or lowering goods must be fenced (except when hoisting or lowering is going on at that opening) and be provided with a hand-hold on each side of the opening.

Chains and Ropes and Lifting Tackle.—No chain, rope or lifting tackle used for raising or lowering persons or goods may be used unless it is of good construction, sound material, and adequate strength, and free from patent defect. Tables of safe working loads must be posted in the stores and elsewhere, but need not cover any lifting tackle the safe working load of which is marked on the tackle itself. Chains, ropes, and lifting tackle in use must be thoroughly examined by a competent person every six months, and must not (excepting fibre ropes and fibre rope slings) be taken into use for the first time in the factory unless they have been tested and certified.

Periodic annealing is required except in the case of ropes and rope slings and other tackle exempted by the Chief Inspector.

A register of all chains, etc. and also of the certificates of tests, must be kept.

Cranes, etc.—All parts and working gear (including anchoring appliances) of cranes and other lifting machines must be of good construction, sound material, and adequate strength, and must be properly maintained. A thorough examination of all such parts by a competent person must be made every fourteen months. A lifting machine must not be taken into use for the first time in a factory unless it has been tested and certified. A register of the examinations and tests must be kept. The safe working load or loads must be shown on every lifting machine; in the case of cranes with a derricking jib an automatic indicator or a table of safe working loads must be attached to the crane.

Rails and tracks of travelling cranes and transporters must be of proper size and construction. If any person is working near the wheel-track of an overhead travelling crane steps must be taken to ensure that the crane does not approach within 20 feet.

Construction of Floors, etc.—Floors, passages, gangways, steps,

stairs and ladders must be soundly constructed and properly maintained, and handrails must be provided for stairs.

Precaution against Falls.—So far as is reasonably practicable, there must be provided

- (1) Safe means of access to every place at which any person has at any time to work, and
- (2) Fencing or other means for ensuring the safety of any person who is to work at a place from which he would be liable to fall more than ten feet and which does not afford secure foothold and, where necessary, secure hand-hold.

Precautions against Gassing.—Special precautions are laid down for work in confined spaces where men are liable to be overcome by dangerous fumes.

Explosions of Inflammable Dust or Gas.—Precautions against explosion are laid down for certain processes and for welding or soldering on containers which have held any explosive or inflammable substance.

Steam Boilers, Steam Receivers, etc.—Every part of every steam boiler and steam receiver must be of good construction, sound material and adequate strength, and free from patent defect. Detailed requirements are laid down as to valves and other fittings. The outlet of every steam container must at all times be kept open and free from obstruction.

Steam boilers and steam receivers and their fittings must be properly maintained and must be thoroughly examined by a competent person, in the case of boilers every fourteen months and after extensive repairs, and in the case of steam receivers every 26 months. A report of each examination must be attached to the General Register. New or second-hand boilers must be certified or examined before being taken into use.

Air Receivers.—Every air receiver and its fittings must be of sound construction and properly maintained. Detailed requirements are laid down as to the fittings.

Air receivers must be thoroughly cleaned, and be examined or tested by a competent person, every 26 months, and a report entered in or attached to the General Register. In some cases a longer period is allowed.

Fire.—Subject to certain exceptions for small works, a certificate (to be attached to the General Register) must be held from the Local Authority that the means of escape in case of fire are such as may reasonably be required. The means of escape specified in the certificate must be properly maintained and kept free from obstruction. Local fire-byelaws must be complied with.

While any person is in the factory for the purpose of employment or meals, doors must not be so locked or fastened that they cannot be easily and immediately opened from the inside. The doors of any room in which more than ten persons are employed, and in the case of newly constructed or converted factories all other doors affording a means of exit from the factory, must be sliding doors or open outwards. Fire exits must be marked by a notice printed in red letters of adequate size.

In certain factories provision for giving warning in case of fire must be made, and effective steps taken to ensure that the workers are familiar with the means of escape and their use and the routine to be followed in case of fire.

Notification of Accidents and Dangerous Occurrences.—Accidents causing loss of life or disabling a worker for more than three days from earning full wages at the work at which he was employed must be reported forthwith to the District Inspector and entered in the General Register. Certain dangerous occurrences must all be reported

whether disablement is caused or not, *e.g.*, the bursting of a revolving vessel, wheel or grindstone moved by mechanical power, the collapse or failure of a crane, hoist or other lifting appliance, or any part thereof (except the breakage of chain or rope slings), or the overturning of a crane; and explosions or fires in certain circumstances.

(c) Welfare.

Drinking Water.—An adequate supply of wholesome drinking water, with an upturned jet convenient for drinking or suitable drinking vessels with facilities for rinsing them, must be provided.

Washing Facilities.—Adequate and suitable washing facilities (to include soap and clean towels or other suitable means of cleaning or drying) must be provided and maintained for persons employed in any process in which any poisonous substance is used, or in any process prescribed by the Minister as liable to cause dermatitis or other affection of the skin (see also paragraph as regards Regulation for special trades) and also general factory use.

Accommodation for Clothing.—Adequate and suitable accommodation for clothing not worn during working hours, with such arrangements as are reasonably practicable for drying such clothing, must be provided.

Facilities for Sitting.—Suitable facilities for sitting must be provided for all female workers whose work is done standing, sufficient to enable them to take advantage of any opportunity for resting.

First Aid.—In every factory there must be provided a first-aid box or cupboard of the prescribed standard, containing nothing except first-aid requisites, and in charge of a responsible person who must be always readily available during working hours. In every workroom a notice must be affixed stating the name of the person in charge of the box provided in respect of that room. Where more than 150 persons are employed at one time, an additional box or cupboard for every additional 150 persons or fraction of that number is required. If more than 50 persons are employed the person in charge of each box must be trained in first-aid treatment.

Whole-time Medical and Nursing Services.—During the Second World War, the need for these services was recognised for the larger works and the *Factories (Medical and Welfare Services) Order, 1940*, provided that the

“ Occupier of Factory (on war work) shall, if so directed, make arrangements to the satisfaction of the Inspector, by way of wholetime or part-time employment of such numbers of medical practitioners, nurses and supervisory officers as the Inspector may specify, for one or more of the following services, namely :

- (a) medical supervision of persons employed in the factory in the aforesaid manufacture, repair or work,
- (b) nursing and first-aid services for such persons,
- (c) supervision of the welfare of such persons.

(d) Employment of Women and Young Persons.

Scheme of Hours.—The hours of work permissible, and the intervals which must be allowed, in a particular factory (apart from “ overtime ”) are fixed by a Notice posted in the factory in the prescribed Form (usually Form 11); but this scheme of hours and compulsory intervals must (subject to certain Special Exceptions, which see below) comply with certain conditions.

A change in the scheme must not be made until notice has been given to the District Inspector and posted in the factory, and cannot generally be made more often than once a quarter.

The conditions are as follows :

- (1) *Hours of Work (excluding Intervals)*—not more than 9 in a day or 48 in a week (44 for young persons under 16, except in industries in which the Minister allows a higher figure).
- (2) *Period of Employment (including Intervals)*—not more than 11 hours in a day, and not to begin before 7 a.m. or end later than 8 p.m. (6 p.m. for young persons under 16) or, on Saturday, 1 p.m.
- (3) *Spell of Work*—not more than $4\frac{1}{2}$ hours without an interval of at least half an hour, but where an interval of not less than 10 minutes is allowed (under the notice) in the course of a spell, the spell may be 5 hours.
- (4) *Simultaneous Period and Intervals*—the periods of employment and intervals fixed by the notice must be the same for all the women and young persons except that the period of employment for those under 16 may end earlier than that of the others.

Subject to certain special exceptions, women and young persons must not be allowed to remain during their meal-times in any room in which a manufacturing process is being carried on.

Special Exceptions.—In some classes of factory, certain variations or exceptions from the above conditions may be adopted in fixing the scheme of hours ; but, before this can be done, notices in the prescribed form must be sent to the District Inspector and posted in the factory. Particulars as to these exceptions are indicated in the notices.

Overtime.—“ Overtime ”—that is, work in the factory outside the normal period of employment fixed for the day by the notice—is authorised for women and young persons over 16 for dealing with pressure of work. For a woman or young person working overtime the hours worked in the day in question must not exceed 10 and the period of employment must not exceed 12 hours between 7 a.m. and 8 p.m.—in the case of women 9 p.m.—or on Saturday 1 p.m. The overtime for the factory (not for each individual) must not exceed 6 hours in any week or 100 hours in any calendar year. The Minister may modify these conditions (for example, he may authorise 150 hours for women) in special classes of case.

Where the Special Exemption (section 82) for factories operating the five-day week is adopted, the hours worked by a woman or young person over 16 working overtime may extend on that day to $10\frac{1}{2}$ instead of 10 ; alternatively, if no woman or young person is employed overtime on any other day in a week, $4\frac{1}{2}$ hours (to reckon as “ overtime ”) may be worked on a sixth day in that week.

Employment outside the Factory.—A woman or young person employed in the factory must not be employed outside on the same day in the business of the factory or in any other business carried on by the occupier, except during the factory hours of work specified in the Notice. (This does not apply to certain young persons—van boys, errand boys, etc.—employed mainly outside the factory, whose hours are not regulated by the Notice but by other provisions [see later paragraph]). Women and young persons over 16 may, however, be so employed by the factory occupier in a shop outside the factory period of employment (but not during the intervals), subject to compliance with the requirements governing overtime in the factory. Such employment will reckon as overtime for the factory.

Prohibition of Sunday Employment.—Subject to certain Special Exceptions (*e.g.*, for Jews and for certain industries) Sunday employment of women and young persons in factories is prohibited, and women and young persons employed in a factory on any other day of the week may not be employed on Sunday about the business of the factory or in any other business carried on by the occupier.

Holidays.—Women and young persons must be allowed as holidays in each year :

- (1) *In England and Wales*, Christmas Day, Good Friday, and every Bank Holiday unless the occupier not less than three weeks before any one of those days posts a notice substituting another weekday :
- (2) *In Scotland*, six week-days, specified in a notice posted in the factory not less than three weeks before the holiday (in Burghs two of the days, not less than three months apart, are to be fixed by the Town Council).

At least half the holidays must be allowed between 15th March and 1st October.

Two-Shift System.—The Minister may, on the application of the occupier, authorise the employment of women and young persons over 16 on shifts between 6 a.m. and 10 p.m. (Saturdays 2 p.m.) subject to such conditions as the Minister may consider necessary for their welfare and interests. With certain exceptions, the shifts must not average more than eight hours per day, and the employer's application cannot be granted unless the majority of the workpeople concerned have consented by secret ballot. An order of the Minister prescribes the information to be given to the workpeople before the ballot and the manner in which the ballot is to be conducted.

Certificates of Fitness.—No "young person" may be employed in a factory unless the prescribed particulars have been entered in the General Register. A young person under 16 must not remain in employment in a factory unless the Examining Surgeon certifies that the young person is fit for it.

Van Boys, Errand Boys, etc.—The above provisions do not (unless the occupier so elects, and notifies the District Inspector) apply to young persons employed wholly or mainly outside the factory in collecting, carrying or delivering goods, carrying messages or running errands, whose hours will be regulated by different provisions (section 98) which broadly speaking provide for a 48-hour week with 50 hours overtime in a year for those over 16, no Sunday employment, and the same hours as in factories. The maximum weekly hours for those under 16 are limited to 44. A record (on Form 38) must be kept of the hours actually worked by and the intervals allowed to each young person.

(e) General Regulations.

Notice of Occupation.—Within one month after beginning to occupy a factory or introducing mechanical power into a factory the occupier must furnish the District Inspector with certain particulars.

General Register.—The occupier must keep a General Register in the prescribed form, with all the entries and enclosures as directed therein.

Special Regulations and Welfare Regulations made by the Minister for particular industries or processes must be observed, and printed copies or prescribed abstracts of all such regulations in force in any factory must be kept posted in the factory.

Outworkers.—Where work of certain kinds, specified by regulations of the Minister, is given out to a workman or contractor to be done outside the factory, a list of all such persons must be kept in the prescribed form and a copy of this list must be sent to the Local Authority during February and August in each year. The requirement applies irrespective of whether the materials for the work are supplied by the occupier or not.

Duties of Persons Employed.—A person employed must not wilfully interfere with or misuse any means, appliance, convenience or other thing provided in pursuance of the Act for securing health, safety or welfare, and he must use any means or appliance for securing health or safety provided for him under the Act. He must not wilfully and without reasonable cause do anything likely to endanger himself or others.

Inspection.—H.M. Inspectors have power to inspect every part of a factory by day or night. They may require the production of Registers, certificates and other papers. They may examine any person found in the factory, either alone or in the presence of any other person as they think fit, and may require him to sign a declaration of the truth of the matters about which he is examined. They may also exercise such powers as may be necessary for carrying the Act into effect, including certain powers of taking samples for analysis. Every person obstructing an Inspector is liable to a penalty.

Local Authorities are to enforce, generally,

- (1) in the case of ALL factories, the provisions as to sanitary conveniences ;
- (2) in the case of *factories in which mechanical power is not used* (except for heating, ventilating, and lighting) the other provisions under the HEALTH section, referred to on pages 284–285 (except those as to lighting ; that is to say, cleanliness, overcrowding, temperature, ventilation, and drainage of floors).

There are two exceptions :

- (1) certain railway, dock, and canal premises, and
- (2) where the Minister makes special provisions against risk of industrial disease or injury to health.

The Local Authorities referred to are : in London, the City and Metropolitan Borough Councils ; in the rest of England and Wales, the Borough, Urban, or Rural District Council ; and in Scotland, the County Council or, in a Burgh, the Town Council.

WAGES

The terms and conditions of employment in Great Britain are mostly settled by Collective Agreements, reached by voluntary methods and without State intervention. Where, however, suitable organisation for collective agreement between the workers and employers in an industry does not exist, or where difficulties are caused because of one or other of the parties being at a relative disadvantage in bargaining strength, the State has set up Statutory Bodies for dealing with wages and conditions of work. This intervention of the State has occurred more particularly where an industry includes a large number of small units. State regulation usually fixes a minimum rate of wage. One feature of all Statutory Wage Regulation machinery is that the wage-fixing authority in all cases includes representatives of employers and workers in the industry concerned and, therefore, the principle of self-government in industry is maintained subject only to certain safeguards which are necessary where mandatory powers are exercised. The principal acts in operation are :

- (1) *The Trade Board Acts, 1909 and 1918.*
- (2) *The Coal Mines (Minimum Wage) Act, 1912.*
- (3) *The Agricultural Wages (Regulation) Acts, 1924, 1937, and 1940.*
- *(4) *The Cotton Manufacturing Industry (Temporary provisions) Act, 1934.*
- (5) *The Road Haulage Wages Act, 1938.*
- (6) *The Road Haulage Wages (Temporary Provisions) Act, 1940.*
- (7) *The Catering Wages Act, 1943.*

The *Holidays With Pay Act, 1938*, gave additional powers to Trade Boards, Agricultural Wages Committees, and the Road Haulage Control Wages Boards to fix minimum rates of wages in respect of holidays provided for by these authorities.

The Common Law is not concerned specifically with the terms arranged mutually between employer and employed, as in cases of contract the law does not enquire into the adequacy of the consideration, and statute law has been necessary to protect the workers against "sweating" and other evils for

* Inoperative unless renewed yearly.

which the Common Law might give no redress. The Statute Laws with which the student needs to be concerned in this connection may be grouped as follows :

- (1) Particulars of Work and Check-Weighing.
- (2) Truck Acts.
- (3) Trade Boards.

1. Particulars of Work.—The Factories Act, 1937, provides for piece-workers being able to compute the wages due to them ; consequently an Abstract has to be posted in all factories. This Abstract includes the following paragraphs :

Piece-Work Particulars. In textile factories and in certain other classes of factories specified by regulations or by the Minister, every worker paid by the piece must have supplied to him such written particulars of the work and of the rate of wages applicable as will enable him to compute the amount of his wages. In some cases this extends to outworkers.

If a worker discloses such particulars for the purpose of divulging a trade secret, he will be guilty of an offence.

In the worsted and woollen trade (other than hosiery) particulars of the rate of wages applicable to each weaver's work, and in the cotton trade the basis and conditions by which the weaver's prices are fixed, must be exhibited on a placard.

Prohibition of Deductions from Wages. The occupier must not make a deduction from wages in respect of anything he has to do or provide in pursuance of the Act, or permit any person in his employment to receive payment from other employees for such services.

Check-Weighing.—Another form of protection to piece-workers is that of check-weighing. This originally applied to mines, but has been extended to other industries where wages are paid on a basis of weight. These are : manufacture of iron and steel, loading and unloading of vessels (stevedores), getting of limestone and chalk from quarries, and the manufacture of cement and lime. Under the *Coal Mines Regulation Act* of 1887, and the *Check-Weighing In Various Industries Act* of 1919, the piece-workers have the right to appoint their own representatives, as check-weighers, to check the weighing of the mineral gotten or handled.

2. Truck Acts.—The essence of the Truck Acts * is that wages must be paid in money only, and that fines and deductions are illegal unless made in pursuance of a contract between the employer and the worker. The position is so clearly understood to-day, and fining as a system of management has been so largely abandoned, that little more need have been said on the matter; but the Truck Acts have had to combat so many abuses in the past that a very definite interest attaches to a *Memorandum on the Truck Acts* ³² issued by the Home Office in 1898.

In the Abstract of the *Factories Act*, 1937, which is posted up in every factory, appears this :

NOTE AS TO THE TRUCK ACTS

Truck Acts.—The Truck Acts require that wages shall be paid in money only. Payment in goods, or otherwise than in coin, is illegal. This is subject to certain exceptions in regard to the supply of medicine, medical attendance, fuel, materials, tools, etc., rent, food cooked and eaten on the premises; provided a written contract is made and signed by the worker. The charges for fuel, materials, tools, etc., must not exceed their real and true value.

Any express or implied agreement as to the manner or place in which wages are to be spent (for the worker's private use) is illegal. A breach of the Truck Acts not merely entitles the worker to recover the fine or deduction or the wages paid in goods, but is also punishable by penalty on summary conviction.

Except in the case of persons engaged in any branch of cotton weaving in Lancashire, Cheshire, Derbyshire, or the West Riding of Yorkshire—

All fines and all deductions or charges in respect of bad work, injury to the property of the employer, or the use or supply of materials, tools, etc., are illegal unless made in pursuance of a contract between the employer and the worker. The contract must be in writing and signed by each worker, or its terms must be contained in a Notice affixed in the works; and a copy must be given to each worker when the contract is made, and also subsequently on request.

In the case of fines, the contract must specify clearly the matter in respect of which a fine may be imposed, and the amount of the fine.

In the case of materials or tools, the deduction or charge must not exceed the cost thereof to the employer.

No fine or deduction or charge (or contract respecting the same) is legal unless it is fair and reasonable.

Written particulars must be given to the worker on each occasion when a fine or deduction or charge is made.

A register of all fines imposed must be kept. The contract and register must be produced on demand of H.M. Inspectors.

* “ The character of Truck, a system of barter under which wages are paid in goods and not in money, has varied considerably since the first Act of 1464, which repressed the payment of workers in ‘ pins, girdles, and unprofitable wares ’ and ordered it to be in true and lawful money.” *Report of the Chief Inspector of Factories*, 1932.²⁶

3. Trade Boards.—As early as 1885 the existence of “sweating” in certain trades, particularly in the chain trade, box-making trade, and some sections of the clothing trades, engaged the attention of various reformers, who contended that wages were paid which were not reasonable and on which no person could be expected to subsist. In 1890 a Select Committee of the House of Lords issued a report confirming many of the allegations as to “sweating” of workers, but it was not until 1908 that a Select Committee of the House of Commons gave it as their opinion that legislation was necessary to remedy the evil. They recommended the establishment of “Wages Boards” immediately in tailoring, shirt-making, and under-clothing making, boot-making, chain- and nail-making, the cutlery and hardware trades, and the finishing processes of machine-made lace. They further proposed that the Home Secretary should be empowered to establish such Boards, after enquiry in any trade in which no adequate machinery existed for the regulation of wages. The Committee was primarily concerned with home-workers, but found that “sweating” existed also among factory workers in trades in which home-work was prevalent.

The *Trade Boards Act* of 1909 was the outcome of the recommendations of this Report, and its scope included others than home-workers. Its principal features were :

- (1) Minimum rates of wages are fixed trade by trade ;
- (2) The power of fixing such rates is entrusted, not to a Government department or to a judicial or quasi-judicial body, but to a joint Board composed of equal numbers of employers and workers in the trade concerned, with the addition of a few independent “appointed members.” Women, equally with men, are eligible for appointment as representative or “appointed” members ;
- (3) The rates fixed by a Trade Board become, when confirmed by a Minister of the Crown, enforceable by either civil or criminal proceedings, and are enforced at the expense of the Government, through a body of inspectors, appointed by the Ministry of Labour and National Service. The officials of the Ministry, whose duty it is to enforce the law, and, if necessary, to prosecute defaulting employers, may themselves institute civil proceedings on behalf of the worker, if he fails to do so himself.

An amending Act was passed in 1918, bringing in amendments to facilitate the formation of fresh Trade Boards and to improve the administrative machinery as suggested by experience, while leaving unchanged the general structure of the 1909 Act. Whereas in the Schedule attached to the 1909 Act only four trades were listed, the 1918 Act provided that Trade Boards may be set up in any trade in which "no adequate machinery exists for the effective regulation of wages throughout the trade and to which it is expedient to apply the Act, having regard to the rate of wages prevailing in the trade or any part of the trade."

A list of the Trade Boards in operation at June 1944 is given below. (Where marked (2) it indicates that separate Boards exist for (a) England and Wales and (b) Scotland.)

Aerated Waters (2).	Linen and Cotton Handkerchief and Household Goods and Linen Piece Goods.
Baking (2).	Make-up Textiles.
Boot and Floor Polish.	Milk Distribution (2).
Boot and Shoe Repairing.	Ostrich and Fancy Feathers and Artificial Flowers.
Brush and Broom Manufacture.	Paper Bag-making.
Button Manufacture.	Paper Box-making.
Chain-making.	Perambulator and Invalid Carriage Manufacture.
Coffin Furniture and Casement Making.	Pin, Hook and Eye and Snap Fastener Manufacture.
Corset Manufacture.	Readymade and Wholesale Bespoke Tailoring.
Cotton Waste Reclamation.	Retail Bespoke Tailoring (2).
Cutlery-making.	Rope, Twine and Net.
Dressmaking and Women's Light Clothing (2).	Rubber Manufacture.
Drift Nets Mending.	Rubber Reclamation.
Flax and Hemp.	Sack and Bag Manufacture.
Fur.	Shirt-making.
Furniture Manufacturing.	Stamped and Pressed Metal Wares.
Fustian Cutting.	Sugar Confectionery and Food Preserving.
General Waste Materials Reclamation.	Tin Box Manufacture.
Hair, Bass and Fibre.	Tobacco Manufacture.
Hat, Cap and Millinery (2).	Toy Manufacturing.
Hollow-ware.	Wholesale Mantle and Costume-making.
Jute.	
Keg and Drum-making.	
Lace Finishing.	
Laundry.	

The Functions of the Trade Boards are :

- (1) To fix a minimum rate or rates of wages for time work.

They may also fix other minimum rates, thus :

- (2) General minimum piece rates,

- (3) Special minimum piece rates,
- (4) A guaranteed time rate,
- (5) A piece-work basis time rate,
- (6) Overtime rate,
- (7) To provide Holidays with Pay at minimum rates per
Holidays With Pay Act, 1938.

Payment and Enforcement of such Rates.

Every employer in the trade must exhibit in the factory the Board of Trade notice giving particulars of the rate, and he is required to pay wages at not less than the minimum to any worker who performed any work for which the minimum rate is in force (subject to exemption where an injured or infirm worker is employed).

The employer must keep such records of hours worked and wages paid as are necessary to show that workers are paid at not less than the appropriate rate. There are heavy fines for non-compliance with the Trade Board rates: The Ministry of Labour and National Service have inspectors, who, before the outbreak of war in 1939, made a 100 per cent. inspection. The following is a summary, in round figures, of the results of the inspections made during two five-year cycles (1930 to 1934 and 1935 to 1939) and one four-year cycle (1940 to 1943):

	Number of workers whose wages were examined.	Number underpaid.	Amount of arrears recovered for work- ers through the de- partment.
1930-34 . .	1,040,000	31,500	£138,000
1935-39 . .	1,100,000	32,500	£126,000
1940-43 . .	580,000	30,000	£123,000

Convictions against employers in respect of 206 establishments were given in the Courts for infringement of the Acts during 1930 to 1934, and in respect of eighty-three establishments during 1935 to 1939.

Fair Wages Clause in Contracts and Tenders.

The revelations of the evils of wage-cutting revealed by the Sweating Committee in 1891 caused the House of Commons

then to pass a "*Fair Wages Resolution*," which, although not having the force of statutory law, has helped to raise the level of wage payments. It sought to direct attention to three points :

- (1) the prevention of evils disclosed by the Sweating Committee ;
- (2) the prevention of abuses arising from sub-letting ; and
- (3) the payment of " current " rates of wages

with the object of protecting contractors against under-cutting by bad employers and to ensure that persons employed on Government contract work received wages not less favourable than those paid by good employers in the Trade.

The subject has come up for review from time to time by the House of Commons, and in 1909 an improved *Fair Wages Resolution* was passed. It concerned only Government contracts, but the principle of the Resolution has been widely extended, so that the Standing Orders of the majority of Local Authorities in Great Britain now provide for the inclusion of a Fair Wages Clause in contracts. The principle has been embodied in a large number of Acts, which provide assistance to industries or Public Authorities by way of grant, loan, subsidy, guarantee, or licence. The following Acts may be cited as examples :

Sugar Industry (Reorganisation) Act, 1936.

Bacon Industry Act, 1938.

Cinematograph Films Act, 1938.

The advent of war in 1939 prevented amendment of the 1909 resolution, but in 1942 an Agreement was reached between the British Employers' Confederation and the Trades Union Congress and the Government on the draft of a new Resolution, which was issued in the form of a White Paper, in 1942 (Cmd. 6399).

The following is the text of the new draft :

Fair Wages Resolution.

" 1. (a) The contractor shall pay rates of wages and observe hours and conditions of labour not less favourable than those established for the trade or industry in the district where the work is carried out by machinery of negotiation or arbitration to which the parties are organisations of employers and trade unions representative respectively of substantial proportions of the employers and workers engaged in the trade or industry in the district.

" (b) In the absence of any rates of wages, hours or conditions of

labour so established the contractor shall pay rates of wages and observe hours and conditions of labour which are not less favourable than the general level of wages, hours and conditions observed by other employers whose general circumstances in the trade or industry in which the contractor is engaged are similar.

"2. The contractor shall in respect of all persons employed by him (whether in execution of the contract or otherwise) in every factory, workshop or place occupied or used by him for the execution of the contract comply with the general conditions required by this Resolution. Before a contractor is placed upon a department's list of firms to be invited to tender, the department shall obtain from him an assurance that to the best of his knowledge and belief he has complied with the general conditions required by this Resolution for at least the previous three months.

"3. In the event of any question arising as to whether the requirements of this Resolution are being observed, the question shall, if not otherwise disposed of, be referred by the Minister of Labour and National Service to an independent Tribunal for decision.

"4. The contractor shall recognise the freedom of his workpeople to be members of Trade Unions.

"5. The contractor shall at all times during the continuance of a contract display, for the information of his workpeople, in every factory, workshop or place occupied or used by him for the execution of the contract a copy of this Resolution.

"6. The contractor shall be responsible for the observance of this Resolution by sub-contractors employed in the execution of the contract, and shall if required notify the department of the names and addresses of all such sub-contractors."

STATE INSURANCE

This type of Social Insurance began when the *National Insurance Act*, 1911, came into operation in July 1912.

It dealt with both sickness and unemployment benefit. From year to year the scope of these insurances has been increased by Amending Acts. These were consolidated by an *Unemployment Act* in 1935, and a *National Insurance Act* in 1936. These were further amended by the following Acts, now cited for reference only :

- (1) *National Health Insurance Acts*, 1936 to 1944,
- (2) *Old Age Pension Act*, 1936,
- (3) *Widows', Orphans', and Old Age Contributory and Supplementary Pensions Act*, 1941,
- (4) *Old Age and Widows' Pension Act*, 1941,
- (5) *Unemployment Insurance Acts*, 1935 to 1944,
- (6) *Unemployment Assistance Acts*, 1934 to 1940,
- (7) *Workmen's Compensation Acts*, 1925 to 1945.

In 1944 a new *Ministry of National Insurance* was created

to take over the control of the above Acts. At this period a Report on State Insurance had been produced by Sir William (now Lord) Beveridge, proposing far-reaching changes in the law.

The Government then brought in Bills to amend and extend the scope of State Insurance and, to date of publication, Parliament has brought into operation two Acts which make great changes in the social legislation of Great Britain :—

National Insurance Act, 1946 (No. 67),*

National Insurance (Industrial Injuries) Act, 1946 (No. 62),

which are now operative.

The principal effects of these two important legislative enactments are summarised as follows :

NATIONAL INSURANCE ACT, 1946

The purposes of the Act are :

- (1) to establish an extended system of national insurance providing cash payments by way of unemployment benefit, sickness benefit, maternity benefit, retirement pension, widows' benefit, guardian's allowance, and death grant ;
- (2) to amend existing enactments relating to both contributory and non-contributory old age pensions, widows' and orphans' pensions, unemployment and national health insurance ;
- (3) to provide for the making of payments towards the cost of a national health service.

Subject to certain exceptions, all persons in Great Britain above school-leaving age and under pensionable age, must become insured under this Act, and thereafter continue until death to be so insured.

Such persons are referred to as "insured persons." They are in three categories :—

* The Act covers so vast a field of social insurance that only a brief note can be made here of the most important of its conditions. A study of the Act is recommended (it is obtainable from *H.M. Stationery Office*, price 2s.).

- (a) *employed persons*, gainfully occupied in employment in Great Britain, under a contract of service : also employed outside Great Britain in continuation of such service ;
- (b) *self-employed persons*, gainfully employed in Great Britain, who are not “employed” persons ;
- (c) *Non-employed persons* ; that is, persons who are not “employed” or “self-employed” persons.

Where persons are employed as in (a) above, their employment is referred to as an “employed contributor’s employment.” It would appear that this Section of the Act does not apply to the following exceptions :

- (i) employment of a casual or subsidiary nature, or where the insured person is engaged to an inconsiderable extent ;
- (ii) employment in the service, or for the purposes of the trade or business, or as partner, of the insured person’s husband or wife ;
- (iii) employment by a relative in the common home of the insured person and the employer.

Payments of benefits are made from the National Insurance Fund. This Fund is maintained by contributions payable :

- (a) by insured persons,
- (b) by employers,
- (c) out of moneys provided specially by Parliament.

The rates of payment for the first five years of the operation of the Act will be slightly lower than in succeeding years. The following tables show the amounts payable weekly at present by the above three groups. Higher rates will come into force in 1952. Reference should be made to the First Schedule of the Act for particulars.

The Treasury may vary the rates of contribution to stabilise employment. (Sec. 3 of Act.)

No contributions are payable when an employed person is not working, either by reason of unemployment or of incapacity for work. In both cases the employed person can qualify for unemployment benefit or sickness benefit, according to the rules of the Act.

A person over pensionable age, who would be an insured person were he under pensionable age, is an insured person to whom the above rates of payments by the employer will apply.

Part III.—Self-Employed Persons' Rates
(*Part III of 1st Schedule*).

Description of self-employed persons	Weekly rate	Amount added by Treasury
	<i>s. d.</i>	<i>s. d.</i>
<i>Men</i> : between 18 and 70 (not including men over 65 who have retired from regular employment)	6 2	1 1
<i>Women</i> : between 18 and 65 (not including women over 60 who have retired from regular employment)	5 1	11
<i>Boys</i> : under the age of 18	3 7	7
<i>Girls</i> : " " " "	3 1	6

Part IV.—Non-employed Persons' Contribution Rates.

Description	Weekly rate	Amount added by Treasury
	<i>s. d.</i>	<i>s. d.</i>
<i>Men</i> : between 18 and 65	4 8	9
<i>Women</i> : " 18 and 60	3 8	7
<i>Boys</i> : under the age of 18	2 9	5
<i>Girls</i> : " " " "	2 3	4

Also, no contributions are payable during full-time education or full-time unpaid apprenticeship.

Finally, insured persons may be exempted from liability to pay contributions for periods "when they are not in receipt of an income exceeding one hundred and four pounds a year." [Sec. 5 (1) (a) (iii).]

A non-employed person only pays at the Part IV rates, as above, in any contribution week during no part of which he is either employed or a self-employed person.

In the case of an employed person, the employer is liable to pay both his and the insured person's share of the contribution and to recover from the employee the latter's share of the contribution (as set out in Part I above). There are some qualifications to this statement such as, where the insured person does not receive pecuniary remuneration the employer shall not be entitled to recover such contribution from him, and "where he receives wages, the employer shall not be entitled

to recover any such contribution otherwise than by deduction from the remuneration."

The evidence of payment is the affixing of insurance stamps to the insurance cards.

Large corporations may make arrangements for payment of contributions by "some alternative method," under Section 8 (3) of the Act.

Where a person works for more than one employer in any contribution week, it is usual for the first employer to pay for the insurance stamp and to arrange with the other employers for sharing the cost. [Sec. 9 (1) (a).]

Benefits.

The benefits under the Act are :

- (a) Unemployment benefit,
- (b) Sickness benefit,
- (c) Maternity benefit (including maternity grant, attendance allowance and maternity allowance),
- (d) Widow's benefit (including widow's allowance, widowed mother's allowance, and widow's pension),
- (e) Guardian's allowance,
- (f) Retirement pension,
- (g) Death grant.

The rates or amounts of benefit are set out in the Second and Third Schedules of the Act, as follows.

In the case of Unemployment and Sickness Benefit "a person shall not be entitled to either benefit for the first three days of any period of interruption of employment unless, within a period of 13 weeks beginning with the first of those days, he has a further nine days of interruption of employment forming part of the same period of employment." [Sec. 11 (I) (b).]

Where a person loses his employment through misconduct, or has left his employment without just cause, he is disqualified for receiving unemployment benefit for a period not exceeding six weeks. This restriction also applies where he neglects to take suitable employment.

Similarly, a person can be disqualified for receiving sickness benefit for a period not exceeding 6 weeks if he has become incapable of work through his own misconduct, or fails without good cause to submit himself to medical or other examination, as may be required.

RATE OR AMOUNT OF BENEFIT

PART I.

RATES OF PERIODICAL BENEFITS AND OF INCREASES FOR
DEPENDANTS

Description of benefit	Weekly rate	Increase for child (where payable)	Increase for adult dependant (where payable)
1. Unemployment benefit—	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
(a) in the case of a person over the age of eighteen, not being a married woman	26 0	7 6	16 0
(b) in the case of a person under the age of eighteen, not being a married woman—			
(i) during any period during which that person is entitled to an increase of benefit in respect of a child or adult dependant . .	26 0	7 6	16 0
(ii) during any other period . .	15 0	—	—
(c) in the case of a married woman over the age of eighteen—			
(i) during any period during which she is entitled to an increase of benefit in respect of her husband, or during which she is not residing with and is unable to obtain any financial assistance from her husband . .	26 0	7 6	16 0
(ii) during any other period . .	20 0	7 6	16 0
(d) in the case of a married woman under the age of eighteen—			
(i) during any period during which she is entitled to an increase of benefit in respect of her husband, or during which she is entitled to an increase of benefit in respect of a child or an adult dependant other than her husband and she is not residing with and is unable to obtain any financial assistance from her husband	26 0	7 6	16 0
(ii) during any other period during which she is entitled to an increase of benefit in respect of a child or adult dependant . .	20 0	7 6	16 0
(iii) during any other period . .	15 0	—	—
2. Sickness benefit—			
(a) in the case of a person over the age of eighteen, not being a married woman	26 0	7 6	16 0

Description of benefit	Weekly rate	Increase for child (where payable)	Increase for adult dependant (where payable)
Sickness benefit (<i>contd.</i>)	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
(b) in the case of a person under the age of eighteen, not being a married woman—			
(i) during any period during which that person is entitled to an increase of benefit in respect of a child or adult dependant .	26 0	7 6	16 0
(ii) during any other period .	15 0	—	—
(c) in the case of a married woman over the age of eighteen—			
(i) during any period during which she is entitled to an increase of benefit in respect of her husband, or during which she is not residing with and is unable to obtain any financial assistance from her husband .	26 0	7 6	16 0
(ii) during any other period .	16 0	7 6	16 0
(d) in the case of a married woman under the age of eighteen—			
(i) during any period during which she is entitled to an increase of benefit in respect of her husband, or during which she is entitled to an increase of benefit in respect of a child or an adult dependant other than her husband and she is not residing with and is unable to obtain any financial assistance from her husband .	26 0	7 6	16 0
(ii) during any other period during which she is entitled to an increase of benefit in respect of a child or adult dependant .	16 0	7 6	16 0
(iii) during any other period .	15 0	—	—
3. Attendance allowance	20 0	—	—
4. Maternity allowance	36 0	—	—
5. Widow's allowance	36 0	7 6	—
6. Widowed mother's allowance .	33 6	—	—
7. Widow's pension	26 0	—	—
8. Guardian's allowance	12 0	—	—
9. Retirement pension—			
(a) where the pension is payable to a woman by virtue of a husband's insurance and he is alive . . .	16 0	7 6	—
(b) in any other case	26 0	7 6	16 0

PART II

AMOUNT OF GRANTS

Maternity grant	£4
Death Grant, where the person in respect of whose death the grant is paid was at his death :	
(a) under the age of 3	£6
(b) between the ages of 3 and 6	£10
(c) " " " 6 and 18	£15
(d) over the age of 18	£20

THIRD SCHEDULE

Contribution Conditions in respect of the Benefits under the Act :

Unemployment and Sickness Benefit.

1.—The contribution conditions for benefit are that :

- (a) not less than twenty-six contributions of the appropriate class have been paid by the claimant in respect of the period between his entry into insurance and the day for which benefit is claimed ; and
- (b) not less than fifty contributions of the appropriate class or their equivalent have been paid by or credited to him in respect of the last complete contribution year before the beginning of the benefit year which includes the day for which benefit is claimed.

Maternity Grant and Attendance Allowance.

2.—(i) The contribution conditions for a maternity grant or an attendance allowance are :

- (a) that not less than twenty-six contributions of the appropriate class have been paid by the relevant person in respect of the period beginning with that person's entry into insurance and ending immediately before the relevant time ; and
- (b) that not less than twenty-six such contributions have been paid by or credited to that person in respect of the last complete contribution year before the relevant time.

2 (ii) (a) " Relevant person " means the person by whom the conditions are to be satisfied.

(b) " Relevant time " means the date of the confinement or, where the relevant person is the husband and he was dead or over pensionable age on that date, the date of his attaining pensionable age or dying under that age.

Maternity Allowance.

3.—The contribution conditions for a maternity allowance are that :

- (a) not less than forty-five contributions of the appropriate class have been paid by or credited to the claimant in respect of the fifty-two weeks immediately preceding the period for which the allowance is payable ; and
- (b) of those contributions not less than twenty-six are either contributions actually paid or contributions credited by virtue of the section contained in Part IV of this Act relating to married women.

Widow's Benefit and Retirement Pension.

4.—(i) The contribution conditions for widow's benefit or a retirement pension are that :

- (a) not less than one hundred and fifty-six contributions of the appropriate class have been paid by the relevant person in respect of the period between that person's entry into insurance and the relevant time ; and
- (b) the yearly average of the contributions paid by or credited to that person (ascertained as at the relevant time) is not less than fifty.

4 (ii) In this paragraph :

- (a) the expression " relevant person " means the person by whom the conditions are to be satisfied ;
- (b) the expression " relevant time " means the date of the relevant person attaining pensionable age or dying under that age.

Death Grant.

5.—(i) The contribution conditions for death grant are that :

(a) not less than twenty-six contributions of the appropriate class have been paid by the relevant person in respect of the period between that person's entry into insurance and the relevant time; and

(b) either :

(i) not less than forty-five such contributions have been paid by or credited to that person in respect of the last complete contribution year before the relevant time; or

(ii) the yearly average of the contributions paid by or credited to that person (ascertained as at the relevant time) is not less than forty-five.

5 (ii) In this paragraph :

(a) the expression " relevant person " means the person by whom the conditions are to be satisfied ;

(b) the expression " relevant time " means the date of the deceased's death or, where immediately before that date the relevant person was dead or over pensionable age, the date of that person attaining pensionable age or dying under that age.

COMPENSATION FOR INJURIES

Under Common Law there is no redress for accidents as such, but only for accidents as consequence of someone's neglect. The onus of proof of negligence placed the worker under a serious disadvantage, and left him helpless when no question of someone else's negligence occurred. Still worse, when an accident was the result of negligence and proved fatal, the right to claim died with the injured person. To remedy this situation the *Fatal Accidents Act*, 1846, was passed, to deal with cases of fatal accidents arising from negligence. Subsequent Acts were passed, extending the rights to compensation for injuries by accidents, or industrial disease, notably the *Employers' Liability Act*, 1880, and the *Workmen's Compensation Act*, 1897.

Until 1946 the law in this connection was embodied in the *Workmen's Compensation Acts*, 1925 to 1945—the 1925 Act being known as the Principal Act. Now, however, all these

Acts are superseded as from July 1946 by the *National Insurance (Industrial Injuries) Act, 1946* (No. 62), the aim of which is :

“To substitute for the *Workmen's Compensation Acts, 1925 to 1945*, a system of insurance against personal injury caused by accident arising out of and in the course of a person's employment and against prescribed diseases and injuries due to the nature of a person's employment, and for purposes connected therewith.”

Persons to be Insured.

The scope of this Act is very wide, and will generally require that all persons employed in insurable employment shall be insured, in the manner provided by the Act, against personal injury caused by accident arising out of or in the course of such employment. Every person who has entered into or works under a contract of service or apprenticeship with an employer, whether written or oral, and whether expressed or implied (be it manual labour, clerical labour, or otherwise) comes (with a few specified exceptions) under the provisions of this Act. The exceptions are detailed in Part II of the First Schedule of the Act : they include certain specified pilots and other personnel of some types of aircraft ; employment of a casual nature ; employment in the service of husband or wife of the insured person and, in some cases, relating to employment of relatives employed in private dwelling houses. Thus the definition appears to cover nearly every case in which people stand to each other in the relation of Master and Servant.

Formerly, under the *Workmen's Compensation Acts*, the employers were usually the persons liable to pay the agreed compensation to the persons injured or to their representatives or dependants.

The 1946 Act has altered this. Now the agreed compensation is paid through the Post Office, from the *Industrial Injuries Fund* created by the joint weekly or periodic contributions paid by :

- | | | | |
|------------------------|---|---|---|
| (a) the insured person | . | . | } together providing $\frac{4}{5}$ ths
of sum. |
| (b) the employer | . | . | |
| (c) the Treasury | . | . | |

The weekly rates of contribution payable by Insured Persons and Employers are :

Classes of insured persons	Weekly rate of contribution	
	By insured person	By employer
<i>Men</i> : over the age of 18	4 <i>d.</i>	4 <i>d.</i>
<i>Women</i> : „ „ „	3 <i>d.</i>	3 <i>d.</i>
<i>Boys</i> : under the age of 18	2½ <i>d.</i>	2½ <i>d.</i>
<i>Girls</i> : „ „ „	2 <i>d.</i>	2 <i>d.</i>

Benefits.

These cover three types of compensation payable for personal injury arising out of accidents :

- (a) *Industrial injury benefit* shall be payable to the insured person, if, during the period, as a result of injury he is incapable of work ;
- (b) *Industrial disablement benefit* shall be payable to the insured person if he suffers, as a result of the injury, from loss of physical or mental faculty or disfigurement ;
- (c) *Industrial death benefit* shall be payable to such persons as the Act specifies, if the death of the insured person results from the injury.

The rates of benefit payable are for :

Industrial Injury.

At a rate, varying according to the age of the insured person, thus :—

- (a) For an adult person :

45*s.* weekly, and for each additional working day
7*s.* 6*d.*

- (b) For a youthful beneficiary :

- (i) between the ages of seventeen and eighteen,
33*s.* 9*d.* weekly or 5*s.* 7½*d.* each working day ;
- (ii) under the age of seventeen, 22*s.* 6*d.* weekly or
3*s.* 7*d.* each working day.

No payment for the first three days is made unless, as a result of the relevant injury, the injured person is incapable of work during an injury benefit period of not less than 12 working days.

The injury benefit period may extend to 26 weeks or 156 working days.

Disablement Benefit.

Should the insured person be still incapable of working at the end of the injury benefit period of 26 weeks, due to loss of physical or mental faculty, which either :

- (i) is likely to be permanent,
- (ii) is substantial, amounting to not less than 20 per cent. of disability,

then a new principle is introduced : the Disablement Section [12 (2) of the Act] sets out the principles on which the extent of disablement is to be assessed. Where the assessment is for less than 20 per cent. disablement benefit an industrial disablement gratuity is paid, but not in any case exceeding £150—usually payable by instalments. When it is 20 per cent. or more, then a “disablement pension” is payable for the several degrees of disablement. These rates are set out in the Third Schedule, thus :

Standard Rates for Adults.

Degrees of disablement	Weekly rates
%	<i>s. d.</i>
100	45 0
90	40 6
80	36 0
70	31 6
60	27 0
50	22 6
40	18 0
30	13 6
20	9 0

Standard Rates for Juniors.

For the period during which he is under seventeen, half the above rates ;

for the period between seventeen and eighteen, three-quarters of the above rates.

Where a beneficiary is incapable of work, and likely to remain permanently so incapable, the weekly pension shall be increased by 20s. for Adults, and correspondingly less for Juniors. This supplement is termed an "unemployability supplement." In cases of special hardship, not quite entitling one to the above supplement, the pension may be increased by 11s. 3d. weekly (Sec. 14 of Act).

Where the beneficiary, in receipt of a 100 per cent. assessment of disability pension, also requires constant attention, the pension may be increased, in accordance with regulations, but the increase shall not exceed 20s. weekly (or in cases of exceptionally severe disablement up to 40s.). The grant is subject to review and renewal from time to time.

Other provisions apply to periods of hospital treatment, to extra grants where the beneficiary has children, or has adult dependants (Sec. 17 and 18).

Death Benefit.

The widow of the deceased is entitled to death benefit where his death has caused the cessation of payments for her maintenance. The benefit of 20s. weekly is due for life or until she re-marries. In the event of re-marriage she will receive a sum fifty-two times the weekly rate of her pension.

There are further provisions in the case of a second child and further children, whereby the amount is increased to 30s. weekly.

Similarly, should a widower be wholly or mainly dependent upon the deceased, he will receive 30s. a week for life.

Special rules also apply to payment of the pension to children of the deceased (Sec. 21) and to parents or dependent relatives (Sec. 22 and 23).

Administration of the Act.

Generally the Act is administered through the Post Office.

Many regulations exist to govern the varying of the rates of benefit in differing circumstances. These are clearly detailed in the Act, and explanatory pamphlets are issued by the Minister of National Insurance.

The payment of contributions is by means of adhesive or other Insurance Stamps, and the employer is responsible for the purchase of these and for attaching them to the insurance cards, and is authorised to deduct from the pay of the insured person the weekly rate of contribution indicated above.

Much of the administration of the Act will be carried out by Insurance Inspectors, who will be responsible to the Industrial Injuries Commissioner for carrying out the provisions of the Act, for determining claims, and for submission of disputes to local appeal tribunals.

Very full provision is made for research into prevention of accidents and for after-care of injured persons, for vocational training, industrial rehabilitation, provision of artificial limbs, and for any special appliances for insured persons.

Careful perusal of the Act is recommended.

Industrial Diseases (Secs. 55 to 57 of Act).

Here is a distinct departure from the earlier Acts. All diseases due to the nature of the employment, and developed since the passing of the Act, are treated as though they were injuries; and equivalent rates of benefit are paid during the period of disability, subject to requirements for medical examination and attention.

These sections of the Act do not detail the scheduled diseases dealt with under previous Acts. In the present Act they are termed "prescribed" diseases or injuries, and are not named except for the mention of pneumoconiosis (including injury to lungs due to silica dust, asbestos dust, or other dust).

The following is the list of scheduled diseases as set out in the Factory Act Summary, which is exhibited in all works.

The scheduled diseases include the following:—Anthrax, lead poisoning, mercury poisoning, and other specified forms of industrial poisoning, dermatitis or ulceration of the skin produced by dust or liquids, cancer or ulceration of the skin due to handling tar, pitch, bitumen, mineral oil, or paraffin, chrome ulceration, cataract in glass workers, cataract caused by exposure to rays from molten or red hot metal, and twister's cramp. A complete list giving the precise description of the diseases scheduled under the Act may be obtained on application to the *Ministry of National Insurance, Carlton Terrace, S.W. 1.*

Fatal Accidents.

During the Second World War there was a very great increase in the number of persons engaged in the production of munitions and other war requirements, and especially a great influx of women into work previously done only by skilled male workers.

The figures of fatal and non-fatal accidents during this period have shown an unhappy increase of accidents, especially to adult women. *The Annual Reports of the Chief Inspector of Factories* for 1941, 1942, 1943, and 1944 deal very fully with this subject, and note that the increase in the appointment of Safety Officers, the work of the Royal Society for the Prevention of Accidents, and the influence of Foremen and charge hands and of the Joint Production Consultative and Advisory Committees has borne fruit in a noticeable reduction of accidents. Bearing in mind the great increase in volume of work during the recent war years, the following figures reveal a trend towards better accident prevention and greater safety.

Fatal Accidents in 1910 were	1050	in 1939 were	1104
„ „ in 1920	„ 1404	in 1940	„ 1372
„ „ in 1925	„ 944	in 1941	„ 1646.
„ „ in 1930	„ 899	in 1942	„ 1363.
„ „ in 1938	„ 944	in 1943	„ 1220.

Much still remains to be done, and will be done, to reduce these figures with their attendant tale of human anguish, present and future.

Accident prevention has received great attention by the Government. In the *Home Office Industrial Museum*, at Horseferry Road, Westminster, S.W.1. is maintained an up-to-date exhibition of the most modern and efficient methods designed to secure the safety and to promote the health and welfare of factory workers. Skilled custodians give demonstrations and explanations to visitors. A visit is to be recommended both to those with responsibility for the design of factory and office buildings (as to ventilation, lighting, heating, etc.) and the design, lay-out, and guarding of plant and transport facilities and to all who operate them.

Employment of Disabled Persons.

“The time is long past when disabled persons were considered only fit for jobs as lift-operators, doormen and the like” (*Dr. C. N. Swanston*). In 1944 there was passed the *Disabled Persons (Employment) Act, 1944*, an Act to make further and better provision for enabling persons handicapped by disablement to secure employment, or to work on their own account.

Under its provisions the Minister has arranged vocational training courses and industrial rehabilitation courses for persons disabled on account of injury, congenital deformity, or disease (physical or mental condition).

A Register of Disabled Persons in the locality is kept at the Local Employment Offices.

There will be an obligation on all suitable employers with substantial staffs to employ a quota of registered persons to a minimum percentage of the employees, on the lines of the *King's Roll*, established in 1918. Employers will be required to submit to the Minister a yearly certificate of the number of disabled persons in their employ during the year. The records which are to be kept by the employer are to be open for inspection at any reasonable time by the Minister's Inspectors.

National and District Advisory Committees will operate to aid the Disabled persons; the employers and the Ministry to co-operate.

The student will find that careful consideration of this necessarily brief outline helps toward an understanding of the administration of industrial undertakings. He should, however, endeavour to keep abreast of important changes in Industrial Legislation proposed from time to time and subsequently passed into Statute Law.

APPENDIX A

TABLE OF DATES

The general purpose of the following Table is to assist the student to visualise the course of industrial affairs over the centuries. The Table is offered only as providing a starting-point for more extended research. Some items are included deliberately to stimulate study of the significant landmarks in British industrial and commercial development. The main emphasis here is on the earlier technological developments in the fields of Chemistry, Engineering (Civil, Mechanical and Electrical), Metallurgy, and Textiles. Full treatment in these directions has not, however, been attempted, since it is beyond the scope of the book.

*Year or
Period.*

- 1100-30. Rise of Weavers' Gilds.
- 1190. First Town Charter (Leicester).
- 1197. Rise of Gilds Merchant.
- 1215. Magna Carta.
- 1234. Coal discovered at Newcastle-on-Tyne.
- 1327-70. Rise of Craft Gilds.
- 1327-70. Rise of Livery Companies.
- 1331-36. Immigration of Flemish Weavers.
- 1340. Wool first spun at Worsted, Norfolk.
- 1348-49. Black Death.
- 1349-51. Statutes of Labourers.
- 1350-1600. Sheep-farming increasing with consequent enclosure of land.
- 1353. Ordinance of the Staple.
- 1381. Peasants' Revolt.
- 1464. First "Truck" Act.
- 1465. Regulation of Cloth Trade.
- 1473. Printing introduced into England by Caxton.
- 1492. Columbus discovered the West Indies.
- 1496. Earliest English Standard of Length.
- 1496. Rise of Merchant Adventurers.
- 1497. Cabot discovered Newfoundland and Labrador.
- 1514. Incorporation of Brethren of Trinity House.
- 1555. Surveyors of Highways appointed.
- 1555. Weavers' Act.
- 1555. Muscovy Company.
- 1561-82. Immigration of Dutch, Flemish and French artisans.

*Year or
Period.*

- 1563. Statute of Apprentices.
- 1568. Canal at Exeter (3 miles long) constructed by John Trew.
- 1571. Gresham founded Royal Exchange.
- 1577. Drake began his voyage round the world.
- 1579. Levant Company.
- 1588. First important paper mill (Dartford).
- 1589. Lee's knitting frame.
- 1590. Microscope invented by Jansen.
- 1600. East India Company.
- 1606. First English Colony in America founded (Virginia).
- 1607. Galileo constructed first telescope.
- 1619. Dud Dudley's coke process.
- 1624. Sheffield Cutlers incorporated.
- 1634-39. Ship-money exacted.
- 1640. Torricelli's barometer.
- 1651. Navigation Act (*see* 1849).
- 1658. Robert Boyle's air pump.
- 1662. Act of Settlements (having the effect of hampering mobility of labour).
- 1663. Turnpike Roads authorised by Act of Parliament.
- 1685. Velvet manufacture introduced into England.
- 1689. Newton's discovery of Law of Gravity.
- 1694. Bank of England founded.
- 1695. Bank of Scotland founded.
- 1699. Thomas Savery's steam-engine patented.
- 1711. Newcomen's first colliery steam-engine installed near Wolverhampton.
- 1714. Lombe's loom for silk-weaving.
- 1721. First mercury thermometer constructed by Fahrenheit.
- 1724. Dutch swivel looms in use in Lancashire.
- 1725 95. Bakewell's experiments in sheep-breeding.
- 1730. Darby's coke process for smelting.
- 1733. John Kay invented flying shuttle.
- 1738. Lewis Paul's patent for spinning by means of rollers.
- 1740. Benjamin Huntsman's crucible steel process.
- 1748. Paul's wool-carding machine.
- 1750. Nickel discovered by Constedt.
- 1750. Iron rails brought into use.
- 1750 (about). Baltic Exchange opened.
- 1759. Eddystone Lighthouse built in stone by Smeaton and Jessop.
- 1760. Robert Kay's improved shuttle adopted in cotton industry.
- 1760. Roebuck's blast furnace.
- 1760. Cotton Bounties to Colonies.
- 1761. First great canal connecting the Duke of Bridgewater's canal with Manchester.
- 1765. John Metcalf's first road at Harrogate.
- 1767. James Hargreave's spinning jenny.

*Year or
Period.*

- 1768. Richard Arkwright's water spinning-frame.
- 1769. James Watt's steam-engine patent.
- 1769. Smeaton's cannon-boring machine.
- 1770. Dr. Roebuck's lead chamber method of producing sulphuric acid.
- 1770-80. Extension of Enclosure Movement.
- 1773. Positive and negative distinction in electricity discovered by Dufay.
- 1774. Oxygen discovered by Priestly and Scheele independently.
- 1774. Chlorine discovered by Scheele.
- 1774. Wilkinson's cylinder-boring machine.
- 1775. Arkwright's carding machine.
- 1775. Samuel Crompton's spinning mule.
- 1776. James Watt's pumping engine installed in Cornish tin mines.
- 1779. Cartwright's wool-combing machine.
- 1780 onwards. Agricultural machinery development.
- 1782. James Watt constructed a steam-engine to give a rotative movement.
- 1783. Henry Cort's puddling and rolling process.
- 1784. Murdoch's model steam road carriage.
- 1784. Ten-hour day proposed at Manchester Quarter Sessions.
- 1784. Edmund Cartwright's power loom.
- 1785. Arkwright's water frame in general use.
- 1785. Bleaching with chlorine first applied practically by Berthallet.
- 1787. First iron boat built by Wilkinson.
- 1788. William Jessop's flanged railway wheel.
- 1788. Marshall's flax-spinning machine.
- 1791. Samuel Plat's process for water-proofing fabrics.
- 1792. William Murdoch's house illuminated by gas.
- 1792. Kelly's water-power mule.
- 1795. William Desmond's tanning process.
- 1796. Thomas Telford's first iron bridge across the Severn.
- 1797. Vauquelin discovered chromium.
- 1799. Roberts' endless paper machine.
- 1800-20. Completion of Enclosure Movement.
- 1800. Manufacture of ship's blocks on interchangeable system at Portsmouth.
- 1800. Law's "Shoddy" process.
- 1800. Kay's flying shuttle in general use.
- 1801. First Railway Authorisation Act.
- 1801. Jacquard loom.
- 1802. First "Factory" Act (Health and Morals of Apprentices Act).
- 1803. Richard Trevithick's high-pressure steam locomotive.
- 1803-4. Radcliffe weaving inventions.
- 1806. Fulton's passenger steamboat "Clermont" on the Hudson.
- 1807. Gas first used to light a London street (Pall Mall) by Winsor.

*Year or
Period.*

- 1809. The loom "slay" invented.
- 1811. First British river steamboat ("Comet" on the Clyde).
- 1811. Courtois discovered iodine.
- 1812. Steam-engine applied to colliery haulage.
- 1812. First Statutory Gas Company formed.
- 1813. "Puffing Billy" constructed by Hackworth, Hedley and Foster.
- 1813. Clegg patented the gas meter—making sale of gas a commercial success.
- 1813. Horrocks' power loom.
- 1814. Leblanc alkali process introduced into England from France.
- 1814. George Stephenson's first locomotive.
- 1815. John Loudon McAdam appointed Surveyor-General for the British Roads.
- 1815. Davy's safety lamp.
- 1815-47. Ten-hours Movement.
- 1817. John Rennie's Waterloo Bridge opened.
- 1820. Electro-magnetism discovered by Oersted.
- 1824. Aspdin patented Portland cement.
- 1824-25. Repeal of Combination Acts, thus permitting Labour Organisations.
- 1825. Restriction on machinery export removed.
- 1825. William Sturgen's electro-magnet.
- 1825. Roberts' self-acting spinning mule.
- 1825. Stockton and Darlington Railway opened. (Locomotives constructed by George Stephenson.)
- 1826. Kay's flax preparation process.
- 1826. Aluminium isolated by Wöhler.
- 1828. James Neilson's hot-blast process for smelting.
- 1828. Ring-spinning machine (U.S.A.).
- 1829. Guy-Lussac cellulose process.
- 1830. Michael Faraday's discovery of electrical induction.
- 1832. *The Economy of Manufacture*, written by Charles Babbage.
- 1833. Factory Act (appointing first Factory Inspectors, and prohibiting employment of children under nine years of age except in silk mills).
- 1833. First steamship to cross Atlantic under steam ("Royal William").
- 1833. Water-softening by means of lime discovered by Dr. Thomas Clark.
- 1835. Highways Act.
- 1837. James Nasmyth's steam hammer.
- 1837. Cooke and Wheatstone's needle telegraph.
- 1837. Fourness' system of mine ventilation.
- 1839. Andrew Smith's wire rope invention.
- 1840. Introduction of Penny Post.
- 1840 onward. Rise of Produce Exchanges.
- 1841. Regulation of child labour in mines.

*Year or
Period.*

- 1843. Ten-hours Day Act.
- 1843. Hancock patented vulcanised rubber.
- 1844. Bank Charter Act.
- 1844. John Mercer invented "mercerised" cotton.
- 1844. Ebonite first made by Goodyear.
- 1845. Thomson's pneumatic tyre.
- 1846. Discovery of gun-cotton by Schönbein.
- 1846. Armstrong's patent for hydraulic lifting, lowering and hauling machinery.
- 1846. Fatal Accidents Act.
- 1847. Ten Hours Act.
- 1847. Gold discovered in California.
- 1847. Nitroglycerine discovered by Sobrero (Italy).
- 1849. Navigation Acts of 1651 repealed.
- 1850. First street tramway in England (Birkenhead), constructed by George F. Train of U.S.A.
- 1850. Gorries' invention of artificial refrigeration (U.S.A.).
- 1851. First successful submarine cable (Dover to Calais) laid by Brett and Crampton.
- 1851. Gold discovered in Australia.
- 1851. Shale oil industry founded by James Young.
- 1851. Singer's sewing machine (U.S.A.).
- 1851. Donisthorpe and Lister's wool-combing machine.
- 1852. Isaac Holden's "Square Motion" wool-combing machine.
- 1853. James Noble's wool-combing machine.
- 1854. Aluminium process developed by Bunsen and Deville (France).
- 1855. Henry Bessemer's steel process.
- 1855. Importation of Enfield gun machinery from U.S.A.
- 1856. Heilmann's wool-combing machine introduced into England.
- 1857. Holmes' electric arc-light machine.
- 1859. Siemens' open-hearth steel process.
- 1859. First oil-well bored in U.S.A. by Drake.
- 1860. Esparto, in place of rags, used by Thomas Routledge for making paper.
- 1860. First internal combustion engine invented by Lenoir (France).
- 1861. Four-stroke gas engine invented by Nicholas A. Otto (Germany).
- 1861. First (Bessemer) steel rails at Crewe.
- 1861. Ammonia-Soda process for producing alkali discovered by Solvay (Belgium).
- 1862. First Joint Stock Companies Act.
- 1863. First steel ship launched.
- 1863. Ramsbottom's steel locomotive.
- 1865. Tweddell's hydraulic riveter.
- 1866. First successful Atlantic cable.
- 1866. Dynamite discovered by Alfred Nobel (Sweden).
- 1867. Typewriter patented by Scholes, Soule and Glidden (U.S.A.).

*Year or
Period.*

- 1867. Siemens' dynamo.
- 1868. First successful Siemens-Martin mild steel plant (Crewe).
- 1868. Robert Mushet's self-hardening tungsten steel.
- 1869. Telegraph Act transferring private telegraphs to Government.
- 1869. Suez Canal opened.
- 1871. Trade Unions Act.
- 1876. Telephone invented by Alexander Graham Bell (U.S.A.).
- 1877. Edison's phonograph (U.S.A.).
- 1878-79. Thomas and P. Gilchrist invented basic steel process.
- 1878. Telephone in use in England.
- 1879. Incandescent electric lamp invented by Swan and Stern.
- 1879. Edison's electric lamp (U.S.A.).
- 1880. Employer's Liability Act.
- 1880. Wood pulp used for paper-making.
- 1880. Schott (Germany) produced high quality optical glass.
- 1880. Ring-spinning machines in general use in England.
- 1881. First electric railway (Germany).
- 1883. Daimler patented first high-speed internal combustion engine (Germany).
- 1882. Electric Lighting Act, controlling public supply of electricity.
- 1883. First electric tramway in United Kingdom (north coast of Ireland), constructed by Traill and Siemens.
- 1884. Steam turbine patented independently by Hon. C. A. Parsons and de Laval.
- 1884. Chardonnet's artificial silk process (France).
- 1886. Canadian Pacific Railway (Montreal to Vancouver) opened.
- 1886. Gold discovered in Transvaal.
- 1887. Electrolytic process of producing aluminium discovered by Bernard Bros. (France).
- 1889. Daimler engine applied to a road carriage.
- 1890. City and South London Electric "Tube" Railway opened.
- 1891. Carborundum made by Acheson.
- 1892. Cross and Bevan's artificial silk process.
- 1894. "Feed and Speed Men" introduced at Elswick Works by F. W. Brackenbury.
- 1895. Paper on "A Piece Rate System" by F. W. Taylor (U.S.A.), representing 10 years' work.
- 1895. Marconi's inventions in long-distance wireless telegraphy.
- 1895. Production of nickel improved by Ludwig Mond.
- 1896. Speed limit for motor vehicles (under 3 tons) raised from 4 to 12 miles per hour.
- 1896. Conciliation Act.
- 1897. Engineers' "Eight Hours" Strike.
- 1897. Workmen's Compensation Act.
- 1899. First wireless message across the English Channel.
- 1899. National Physical Laboratory founded by the Royal Society.
- 1900. Taylor and White's "high-speed" steel process (Bethlehem Steel Co., U.S.A.).

*Year or
Period.*

- 1901. Rowan premium system introduced.
- 1901. Engineering Standards Committee formed.
- 1903. Improvements by Cattermole in methods of ore concentration.
- 1903. First flight in an aeroplane by the Wright Brothers (U.S.A.).
- 1903. Road speed limit raised to 20 miles per hour.
- 1903. Paper on "Shop Management" by F. W. Taylor (U.S.A.), setting out his system of "Scientific Management."
- 1903. Radium discovered by the Curies (France).
- 1906. Paper on "The Art of Cutting Metals," by F. W. Taylor (U.S.A.), representing 26 years' work.
- 1907. First photograph electrically transmitted between Paris and London by Korn (Germany).
- 1908. Old Age Pensions Act.
- 1909. Labour Exchanges Act.
- 1909. Trade Boards Act.
- 1909. Bleriot's aeroplane flight from Calais to Dover.
- 1911. National Insurance Act.
- 1912. Coal Mines (Minimum Wage) Act.
- 1914-19. First World War } Intensive development in
- 1939-45. Second World War } technology.

APPENDIX B

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SCIENTIFIC RESEARCH AND DEVELOPMENT

Statement of the existing Government Organisation

I. INTRODUCTION

1. The purpose of this Paper is to describe existing Government machinery for the promotion of scientific research and development. The Government hope that it may provide a useful background for the discussion of the part which the Government can play in this important field after the war. The memorandum, both on security grounds and for the reason that it is designed to provide a background for the discussion of post-war plans, does not deal with the great volume of research and development which has been directed to the requirements of war production and the Fighting Services.

2. In Part II a brief description is given of the constitution and functions of the Development Commission and of the three Committees of the Privy Council for Scientific and Industrial Research, for Medical Research and for Agricultural Research and the organisations working under them. The assistance of these organisations is available to all Government Departments. But a number of Government Departments, which are faced with special scientific problems peculiar to their own field of activities, also administer research and development organisations of their own or have Scientific Advisers on their staff. Part III consists of a statement of the existing organisation in each of these Departments.

3. Broadly speaking, and subject to certain exceptions, the Government organisations described in Parts II and III are concerned with research and development which is more or less related to the problems of industry or of the various services administered by the Government. Fundamental research is largely carried out in the Universities. Part IV describes the provision made by the Government for financial assistance to the Universities for this purpose.

4. Part V deals with the Scientific Advisory Committee of the War Cabinet—a new war-time experiment—and with the responsibilities of the Lord President of the Council in relation to scientific research.

II. THE DEVELOPMENT COMMISSION AND THE PRIVY COUNCIL COMMITTEES

A. THE DEVELOPMENT COMMISSION

5. In 1909 Parliament took a new step in the direction of creating a mechanism for central planning and financial aid for scientific research and its application throughout the United Kingdom by establishing, under the terms of the Development and Road Improvement Funds Act, a fund available, among other purposes, for "aiding and developing agriculture and rural industries by promoting scientific research" and for "the development and improvement of fisheries." At that time there was, broadly speaking, no organisation for agricultural research in this country and State aid for fishery research in England and Wales was on a meagre scale, though in Scotland notable pioneer work in the scientific study of fishery problems had been undertaken and the equipment and personnel for this purpose was on a more satisfactory basis.

6. Advances from the Development Fund may be made by the Treasury on the recommendation of the Development Commissioners, who are appointed by His Majesty by warrant under the Sign Manual, to a Government Department or through a Government Department to a public authority, university, college, school or institution or to an association of persons not trading for profit, either by way of grant or of loan and upon such terms and conditions as they may think fit. The Commissioners are also empowered themselves to frame schemes with a view to their adoption by a Government Department or other authorised body, and they may appoint Advisory Committees to assist them.

7. In 1911 the Commissioners framed a scheme in consultation with the Agricultural Departments for the establishment of the present system of Agricultural Research Institutes, which in Great Britain now number more than twenty, and of a scientific advisory service for agriculture, and for the promotion of specific investigations and the granting of scholarships. The greater part of the cost of these services is still found from the Development Fund.

8. Immediately after the last war the Commissioners appointed an Advisory Committee on Fishery Research which reviewed the field of fishery investigations. On their advice the whole organisation for fishery research has been materially strengthened, and the Fund bears nearly all the excess cost over that in 1911 of the fishery investigations of the Ministry of Agriculture and Fisheries, and the cost of developments of the research organisation in Scotland. All the grants to independent institutions are found from the Fund.

9. Advances from the Fund, which is now restricted in scope to Great Britain, have also been made for the provision of technical advice for rural industries through a Central Bureau working in co-operation with Rural Community Councils, and for a variety of experiments in the growth of crops new to this country, such as

sugar beet, flax and tobacco, for livestock improvement, for land reclamation and for economic research and surveys.

B. THE COMMITTEE OF THE PRIVY COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH AND THE DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

10. The Committee of the Privy Council for Scientific and Industrial Research, presided over by the Lord President of the Council, was appointed by an Order-in-Council of 28th July, 1915, to direct, subject to such conditions as the Treasury might from time to time prescribe, the application of any sums of money provided by Parliament for the organisation and development of scientific and industrial research. By the same Order-in-Council an Advisory Council was also constituted to which stand referred, for their report and recommendations, proposals :

- (i) for instituting specific researches;
- (ii) for establishing or developing special institutions or departments of existing institutions for the scientific study of problems affecting particular industries or trades;
- (iii) for the establishment and award of research studentships and fellowships.

On 15th December, 1916, the Department of Scientific and Industrial Research was established as a separate department accounting for its own Vote and responsible to Parliament through the Lord President of the Council.

11. The scope of the Department's work embraces all branches of natural science and all industries, except medicine, agriculture and fisheries (though it includes the transport, storage and processing of foodstuffs) and forestry (though it includes research on timber and other forest products). Within this scope its primary functions are :

- (i) to conduct, or to have carried out, researches required in the national interest for the benefit of the community, or required by other Government Departments to meet their special requirements;
- (ii) to promote the greatest possible use of science by industry through research carried out by individual firms or by co-operative Research Associations;
- (iii) to ensure, as a main source of new knowledge, that an adequate body of pure research is carried out in Universities and other scientific institutions and that the supply of trained research workers needed for laboratories of all types is maintained;
- (iv) to co-operate technically and financially in carrying out special tests and investigations for outside bodies and firms and to provide facilities for such work where necessary.

12. The research programme of the Department and the detailed allocation of the funds put at its disposal are determined, on behalf of the Privy Council Committee, by the Lord President, on the recommendation of the Advisory Council, which consists of a Chairman and (at present) twelve members, who are appointed for their scientific or scientific and industrial qualifications, by the Lord President after consultation with the President of the Royal Society.

13. Among the principal means by which the Department discharges its responsibilities are :

(a) The maintenance of a number of national research establishments under its own control and direction, a list of which is given in paragraph 14 below.

(b) The institution of a scheme for co-operative Research Associations * formed as autonomous bodies to serve the needs of particular industries and financed by contributions from the industries themselves, assisted by grants from the Department the amounts of which are related to the sums contributed by industry.

(c) Grants to individual research workers or to scientific institutions in support of particular investigations of special timeliness and promise.

(d) A scheme of grants for the maintenance of post-graduate students while being trained in Universities as future research workers and of awards to more senior research workers who are likely to become pioneers or leaders of research in their particular fields.

Before the war the Department's activities included publicity by the publication of reports, by contributions to professional and learned societies and to the technical and general press, by participation in Exhibitions, and by broadcasting. The aim of this publicity was the general encouragement of scientific research and its application in industry. Through the intelligence sections of the Department, information was made freely available to enquirers for the benefit of British science and industry.

14. The Departmental organisation consists of a Headquarters Office in London and the following research stations and laboratories in which the bulk of the work undertaken by the Department itself is conducted :

The Building Research Station, Garston, near Watford.

The Chemical Research Laboratory, Teddington.

Food Investigation Stations :

Low Temperature Research Station, Cambridge.

Torry Research Station, Aberdeen.

Ditton Laboratory, East Malling, Kent.

The Forest Products Research Laboratory, Princes Risborough.

The Fuel Research Station, East Greenwich, with local laboratories for the Physical and Chemical Survey of the National Coal Resources at Birmingham, Cardiff, Chester, Glasgow, Leeds, Newcastle-on-Tyne, Nottingham and Sheffield.

The Geological Survey of Great Britain (and the Museum of Practical

* The following Research Associations have been formed by the industries concerned :

Automobile Engineers

Boots and Shoes

Cast Iron

Colliery Owners

Coal Utilisation

Cocoa, Chocolate, Sugar, Confectionery

and Jam Trades

Coke

Cotton

Electrical and Allied Industries

Flour Millers

Food Manufacturers

Gas

Internal Combustion Engines

Iron and Steel

Launderers

Leather Manufacturers

Linen

Non-ferrous Metals

Paint, Colour and Varnish

Manufacturers

Pottery

Printing and Allied Trades

Refractories

Rubber Manufacturers

Scientific Instruments

Shale Oil

Shipbuilding

Wool

Geology), Exhibition Road, South Kensington, S.W.7, with branch survey offices at Edinburgh, Newcastle and Manchester.
 The National Physical Laboratory, Teddington, with departments of Physics, Electricity, Metrology, Engineering, Aerodynamics, Metallurgy, Radio, Ship Design, Light.
 The Pest Infestation Laboratory, Slough.
 The Road Research Laboratory, Harmondsworth, Middlesex.
 The Water Pollution Research Laboratory, Watford, with an outstation at Minworth, Birmingham.

15. The Secretary of the Department is responsible to the Lord President for the whole of the activities of the Department. Under him are a Headquarters staff and a number of Directors, each responsible for a main division of the Department's work. Advisory Boards of independent representatives of science and industry, appointed by the Lord President, on the recommendation of the Advisory Council, exist for each of these Directorates except the National Physical Laboratory.

Until 1918, when it became part of the Department of Scientific and Industrial Research, the National Physical Laboratory was under the control of the Royal Society; and the supervision of its scientific work continues to be exercised by an Executive Committee appointed by the Royal Society, which is accepted by the Lord President as a Committee of the Department.

C. THE COMMITTEE OF PRIVY COUNCIL FOR MEDICAL RESEARCH, AND THE MEDICAL RESEARCH COUNCIL.

16. The Medical Research Council and the Privy Council Committee for Medical Research to which it is responsible were established in 1920, in place of the former Medical Research Committee. The Lord President of the Council is Chairman of the Privy Council Committee and the other members are the Minister of Health and the Secretaries of State for Scotland, Dominion Affairs, the Colonies and the Home Department.

17. The Medical Research Council consists of twelve members who are appointed by the Privy Council Committee and retire in rotation at regular intervals. Three are appointed for general rather than for scientific qualifications and at least one must be a member of the House of Lords and one a member of the House of Commons. The other nine are drawn from the different branches of curative or preventive medicine and the fundamental sciences on which these are based, and are appointed after consultation with the President of the Royal Society and the Medical Research Council themselves.

18. Under their constitution the Medical Research Council have full liberty to pursue an independent scientific policy for the advancement of knowledge towards the relief of human suffering. Provision for the Council's work is made by an annual grant-in-aid under the vote for Scientific Investigation in Civil Estimates. The Council are also empowered to receive and administer additional funds received from public bodies or private benefactors.

19. The Council promote research work in three different ways. Firstly, they maintain certain institutions of their own in which

investigations are made by members of their permanent staff and by temporarily attached workers. Secondly, they arrange for individual members of their scientific staff to work in other institutions such as universities and hospitals. Thirdly, they make temporary grants from time to time in aid of particular investigations by independent workers in universities and hospitals.

20. The Council's chief establishment is the National Institute for Medical Research. This includes laboratories for fundamental work in such subjects as physiology, pharmacology, biochemistry, pathology and bacteriology. The smaller establishments include a laboratory for nutritional research at Cambridge and six departments for clinical research attached to leading hospitals.

21. The Council control their own executive and handle directly the funds which are placed at their disposal. They appoint their own Secretary and other administrative officers and their own scientific staff. The Secretary is also, *ex-officio*, Secretary of the Privy Council Committee.

22. In addition to the representation of various branches of medical science among their own number, the Council have the expert assistance of numerous technical committees which they appoint from time to time to advise them in special subjects. For instance, in the field of industrial health and occupational disease, they are aided by their Industrial Health Research Board, which they have appointed to advise and assist them in promoting scientific investigations into problems of health among workers.

D. THE COMMITTEE OF PRIVY COUNCIL FOR AGRICULTURAL RESEARCH AND THE AGRICULTURAL RESEARCH COUNCIL.

23. The Privy Council Committee for Agricultural Research, to which the Agricultural Research Council is responsible, was established in 1930, and the Council itself in 1931. The Lord President of the Council is Chairman of the Privy Council Committee and the other members are the Minister of Agriculture and Fisheries, who is Vice Chairman, the Secretary of State for Scotland, the Secretary of State for the Home Department, the President of the Board of Education and the Secretary of State for the Colonies.

24. The Agricultural Research Council consists of not more than 15 nor less than 12 members, who are appointed by the Privy Council Committee and retire in rotation. Not less than four, nor more than five, are appointed on account of their general experience of, and interest in, agriculture. The remainder are appointed, after consultation with the President of the Royal Society, on account of their qualifications in one or other of the basic sciences underlying agriculture. The Chairman of the Council is appointed by the Privy Council Committee after consultation with the members of the Agricultural Research Council and the President of the Royal Society. The Council appoint their own Secretary with the approval of the Lord President and after consultation with the President of the Royal Society.

25. The constitution of the Agricultural Research Council is widely framed and enables it to assist any Department of State with related interests, to undertake research, not only in this country but also overseas, and to enter into close scientific collaboration with Northern Ireland, the Dominions, India, the Colonies, or with foreign countries. Provision for the Council's work is made by an annual grant-in-aid under the Vote for Scientific Investigation in the Civil Estimates.

26. The present duties of the Council are twofold. Firstly, they are responsible for the scientific oversight of all agricultural research in Great Britain and for ensuring that the whole research organisation is maintained at a high level of scientific efficiency; in particular the Council act as advisers of the Agricultural Departments and the Development Commission in regard to the estimates as well as the programmes of all the Agricultural Research Institutes.* Secondly, they are free to spend their grant-in-aid at their own discretion and to undertake research themselves, either in research institutions of their own or elsewhere.

27. In 1937 the Council established at Compton in Berkshire a field station mainly for research on animal diseases requiring facilities, including isolation units, on a scale not available at the Research Institutes. These facilities are at the disposal both of the Council's own staff and of research workers from the Agricultural Research Institutes or from other scientific centres. The Council have, in addition, a number of research officers on their staff who are accommodated in institutes or universities, where the best opportunities exist for their particular work; and they have, since 1941, established three research units concerned respectively with animal physiology, soil enzyme chemistry and insect physiology. The Council also make from their own funds grants, normally for a period of three years, for specific investigations to be carried out in universities, colleges, and agricultural research institutes or at any appropriate centre; and they award a limited number of grants for the training of young graduates in agricultural science.

28. Until 1941 the work of the Council was organised under standing committees covering the principal branches of agricultural science, which were mainly composed of Council members, and under technical committees dealing with specific subjects. It was, however, then decided that, in order to maintain as flexible and effective an organisation as possible under war conditions, it would be preferable to put the standing committees and technical committees in abeyance and for the Council itself to meet monthly

* There are now in existence in Great Britain more than 20 Agricultural Research Institutes and stations covering a wide variety of subjects. The majority are not owned or managed directly by the State; some are attached to the universities, whilst others are owned by associations representing branches of the agricultural and horticultural industries. All those which are not State-owned have their own independent governing bodies, although the majority are dependent for the greater part of their maintenance funds on State grants and have received aid towards capital expenditure. State aid for the general purposes of these institutes is borne on the votes of the Ministry of Agriculture and Fisheries and the Department of Agriculture for Scotland, with appropriations in aid from the Development Fund.

and to summon *ad hoc* conferences of the scientific investigators concerned for specific purposes.

29. A full account of the general organisation for agricultural research and of the work in progress is given in "Agricultural Research in Great Britain" (Cmd. 6421), which was published by H.M. Stationery Office in 1943.

III. DEPARTMENTAL ORGANISATIONS

30. The services provided by the Department of Scientific and Industrial Research, the Medical Research Council and the Agricultural Research Council are at the disposal of all Government Departments. This section is concerned only with those Departments which do not rely solely on those three organisations for scientific advice and research and development facilities.

31. For the reason given in para. 1, Part II includes no account of the special war-time activities of the Research Councils. Similarly, in this section, no attempt will be made to describe the Research and Development organisations of the *Service and Supply Departments* (including, for this purpose, the *Ministry of Home Security*) or the many establishments which are working under their direction. Mention may, however, be made of the appointment in 1942 to the Staff of the *Minister of Production* of three full-time Scientific Advisers, whose field of activity is co-extensive with that over which the Minister exercises his powers.

32. The responsibilities of the *Ministry of Agriculture and Fisheries* and the *Department of Agriculture for Scotland* in relation to Agricultural Research Institutes and Stations not owned or managed directly by the State have been described in the footnote to paragraph 26. In addition, the Ministry of Agriculture and Fisheries have their own veterinary and plant pathological laboratories, whilst the Department of Agriculture for Scotland administer a seed-testing and plant-registration station and a plant pathology service of their own. Research on foot-and-mouth disease is carried on under a Committee appointed by the Minister of Agriculture and Fisheries; and a National Institute of Agricultural Engineering, responsible to the Agricultural Machinery Development Board, has recently been established in place of the research institute formerly attached to Oxford University.

33. The Minister of Agriculture and Fisheries and the Secretary of State for Scotland have recently set up new machinery designed to ensure that the results of agricultural research are applied as rapidly as possible in practical agriculture. This machinery consists of Agricultural Improvement Councils for England and Wales and for Scotland, responsible respectively to the Minister of Agriculture and Fisheries and the Secretary of State for Scotland. The functions of these Councils are as follows :

- (1) To keep in close touch with the progress of scientific research and also with experiments in new farming methods, and to advise, in consultation with the Agricultural Research Council, what steps should be taken

to test promising results with a view to their introduction into ordinary farming practice.

(2) To expedite the incorporation into ordinary farming practice of new knowledge proved to be generally applicable.

(3) To review the problems of farmers in order to advise, in the light of current agricultural policy, on problems needing scientific research or increased scientific attention.

The necessary liaison between these two Bodies and between each of them and the Agricultural Research Council is secured in the following manner. A number of members of the Agricultural Research Council, as well as its Secretary, sit on both the Improvement Councils; and a Joint Committee has been formed of the Agricultural Research Council and the two Improvement Councils.

34. The Agricultural Improvement Council for England and Wales has published a first report (H.M. Stationery Office, 1943) and an account of the work of the Agricultural Improvement Council for Scotland has been widely circulated.

35. Scientific investigation of the problems relating to the sea and freshwater fisheries is primarily a function of the *Fisheries Departments* of the *Ministry of Agriculture and Fisheries* and the *Scottish Home Department*, and is financed in part from the Development Fund and in part directly from the Treasury. A broad distinction is made between research directed towards the solution of definite economic problems, which is carried out by the Fisheries Departments, and the more general investigations of marine biological problems which are the province of independent institutions, which receive the bulk of their resources from the Development Fund.

36. There are two main departmental laboratories, at Lowestoft and Aberdeen, and a subsidiary station at Conway for the study of shellfish purification and oyster breeding. In peace-time each main laboratory runs two research ships, one a large trawler and the other a medium-sized motor vessel.

37. The independent institutions engaged in marine and freshwater research in England are the Plymouth Laboratory of the Marine Biological Association of the United Kingdom, the Dove Marine Laboratory at Cullercoats under King's College, Newcastle-on-Tyne, the Port Erin Biological Station, Isle of Man (University of Liverpool), and the Wray Castle (Windermere) Laboratory of the Freshwater Biological Association of the British Empire. Grants are also made to University College, Hull, for marine plankton investigations, and to the Department of Oceanography, Liverpool University, for hydrographical observations. In Scotland the Millport Laboratory of the Scottish Marine Biological Association is the only marine laboratory receiving grant-aid. Grants have also been made to the Universities of Edinburgh and Aberdeen for investigations into diseases of fish and an ecological survey of the Rivers Dee and Don.

38. The responsibilities of the *Colonial Office* in the field of research and development derive in the main from the Colonial Development and Welfare Act, 1940, under which it was laid down that sums of money not exceeding £500,000 a year might be provided annually

for expenditure on research. Monies from this Fund are available either for grants to Colonial Governments to supplement the substantial sums already spent by them on research of various kinds, or to finance work carried out on behalf of the Colonial Empire otherwise than under the control of a Colonial Government.

39. Two steps were taken to administer expenditure under the Act.

The first step was the creation of a Colonial Products Research Council, under the chairmanship of Lord Hankey, to conduct research into the possibility of finding new uses for colonial products which were, or might be, in surplus supply. A Director of Research has been appointed and a number of schemes have been launched for the conduct of fundamental research into such products as sugar, mineral oils and essential oils.

The second step was the appointment of the Colonial Research Committee, composed of a small number of distinguished scientists under the chairmanship of Lord Hailey. The functions of this Committee are to review the whole field of Colonial research and to make recommendations for its organisation and improvement. It has now reviewed most of the field and has caused investigations to be made into various branches of the subject. These investigations have, for the most part, been entrusted to Sub-Committees appointed by other technical bodies responsible to the Secretary of State for the Colonies, such as the Colonial Medical Advisory Committee, the Colonial Advisory Council of Agriculture, Animal Health and Forestry, the Colonial Survey and Geographical Committee and the Colonial Economic Advisory Committee. The Colonial Research Committee has, however, itself appointed a Sub-Committee to review the whole field of the social services.

40. Early in the war the *Ministry of Food* appointed a Scientific Adviser, whose functions have been :

(a) To keep a close watch on the national diet and on the nutritional position of particularly vulnerable groups of the population, *e.g.* children and mothers.

(b) To take part, from the nutritional point of view, in the planning of the national food supply, so as to ensure that adequate supplies of all essential nutrients are available, and

(c) To sponsor investigations into the various technical problems on the food front thrown up by the war.

41. During 1943 the Ministry of Food took over from the Research Association of British Flour Millers their laboratories situated at St. Albans, which have now become the Cereals Research Station of the Ministry. At this station investigations are carried out on a wide range of problems relating to the production of a flour of high nutritive value adapted to war-time needs.

Generally speaking, however, the Ministry does not itself conduct research. It works through existing research organisations and, in particular, in connection with technical problems of food manufacture, storage, etc., through the Department of Scientific and Industrial Research.

42. *The Forestry Commission* have a research staff engaged

mainly on field studies. They make grants to Universities and Research Institutions for more elaborate investigations requiring specialised technique and laboratory equipment. Proposals for the extension of forestry research after the war are contained in the report on Post-War Forestry Policy (Cmd. 6447).

43. For general research work and scientific advice *the Ministry of Fuel and Power* relies largely on the Fuel Research Station of the Department of Scientific and Industrial Research. The Ministry is also in close touch, for instance, through the Standing Consultative Conference on Fuel Research, convened by the Department of Scientific and Industrial Research, with the Industrial Research Associations which conduct fuel research.

The Ministry is responsible, through the Safety in Mines Research Board, for a station in which the problems of safety in coal mines are investigated and equipment used underground is tested. Work is also carried out at this station for the Factory Department of the Ministry of Labour and National Service. The Ministry is also responsible for the scientific work in connection with Gas Testing.

44. *The General Post Office* maintains a research and development organisation in which some 800 persons are employed. They are mainly engaged on questions relating to the development of telephone and telegraph apparatus and systems and on similar problems concerning radio telephony and telegraphy.

The organisation is under the direction of the Post Office Engineer-in-Chief, and its senior staff is composed of scientists and of engineers specially selected because of their technical attainments and aptitude for research work.

45. *The Ministry of Health* and the *Department of Health for Scotland* each have their own medical staff under a Chief Medical Officer.* For research work and general scientific advice they rely mainly on the Department of Scientific and Industrial Research, the Medical Research Council and the Agricultural Research Council.

46. The Ministry of Health, however, maintains a pathological laboratory for investigations in connection with infectious diseases and is responsible for the work of the Government Lymph Laboratory. Its medical staff also undertakes epidemiological studies in the field; and provision is made in the vote of the Ministry of Health for expenses in connexion with special enquiries relating to the medical work of the Department.

The Department of Health for Scotland has a Scientific Advisory Committee on Medical Administration and Investigation which is concerned with the application of research in the field of public health. The Secretary of the Medical Research Council is a member of this Committee.

47. By an administrative arrangement which was made in 1941, the Ministry of Health are responsible for advising all Government Departments on the scientific aspects of any nutritional problems with which they may be faced. In this connection the necessary

* The Chief Medical Officer of the Ministry of Health also holds the post of the Chief Medical Officer of the *Board of Education*.

liaison and pooling of scientific knowledge is secured through a Departmental Committee on which all the interested Departments and research organisations are represented. The scientific Adviser of the Ministry of Food (see paragraph 40 above) represents his Department on this Committee.

48. *The Minister of Labour* established in March, 1943, an Industrial Health Advisory Committee to advise him on technical and scientific matters arising from the work of the Factory and Welfare Department of his Ministry in relation to Industrial Health. The Committee is in close touch with the medical organisations under the Health Departments and with the Industrial Health Research Board of the Medical Research Council and the Department of Scientific and Industrial Research.

49. *The Department of Overseas Trade* is responsible for the work of the Imperial Institute. In addition to its own scientific staff, the Institute has two Advisory Councils and fifteen Consultative Committees. It is the primary function of the Institute to promote the utilisation of the raw materials of the Empire, and its laboratories are specially staffed and equipped for the examination of raw materials of all kinds, with a view to determining their possible use and value.

50. *The Treasury* are responsible for the work of the *Government Chemist's Department*. The Government Laboratory, of which this department is in charge, was founded in 1842 to undertake work connected with the chemical control of the revenue. At the present time it has duties imposed upon it by Act of Parliament and also undertakes chemical work for all Departments of State, to which its advice is always available.

51. *The Ministry of Works* carries out full-scale experiments and field experimental work for the research side of which it relies upon the Department of Scientific and Industrial Research. The Controller of Experimental Building Development was appointed in June, 1943, to facilitate and encourage development and experiment by private enterprise and generally to co-ordinate such work. The Ministry is securing, through the Codes of Practice Committee and the British Standards Institution, codification and standardisation of existing knowledge and practice. All these various activities are being co-ordinated under the newly appointed Chief Scientific Adviser to the Ministry.

52. Finally, there are a number of institutions administered by Government Departments which, in addition to their other scientific activities, undertake some research work. These include the Royal Observatories, the Office of the Hydrographer to the Navy, the Ordnance Survey, the Royal Botanic Gardens, the British Museum (Natural History), the Imperial Agricultural Bureaux, and the Science Museum.

IV. FUNDAMENTAL RESEARCH

53. For "fundamental" or "pure" research and for the education of research workers responsibility rests largely with the

Universities, though some fundamental research is done in certain of the Government institutions, and they also provide for the training of their staff for their own special purposes. Government assistance to the Universities is given mainly by the general grant to Universities borne on the Vote for Universities and Colleges, Great Britain, and administered by the University Grants Committee. This Committee, set up in 1919, is appointed by the Chancellor of the Exchequer after consultation with the President of the Board of Education and the Secretary of State for Scotland. It has recently been reconstituted and enlarged and is at present engaged on an examination of the post-war needs of the Universities for all purposes, including research. In addition a number of Departments support special researches of a fundamental character in Universities by way of grants (cf. paragraphs 13, 19 and 27 above); and grants for agricultural education in Universities and Colleges are made by the Departments of Agriculture.

V. CO-ORDINATION AND CENTRAL ORGANISATION

54. The necessary co-ordination between the various organisations described in the earlier sections of this paper is secured by the normal arrangements for interdepartmental consultation and by more formal machinery in cases where overlapping of departmental interests occurs. In addition there is the system of advisory councils and committees by means of which the scientific knowledge bearing upon any given problem, which is available both within and outside the Government service, is pooled and placed at the disposal of the Department responsible for dealing with that problem.

55. Early in the war a further step was taken in order to ensure that the best scientific advice should be available to the Government as a whole. This step was the appointment, in October, 1940, of the Scientific Advisory Committee of the War Cabinet. This Committee is composed of the President and two Secretaries of the Royal Society and of the Secretaries of the Department of Scientific and Industrial Research, the Medical Research Council and the Agricultural Research Council. Until December, 1942, the Committee sat under the chairmanship of a Minister of the Crown other than the Lord President. In December, 1942, the Lord President became President of the Committee, the Chairmanship being assumed by Sir Henry Dale. Since its establishment the Committee has reported to the War Cabinet through the Lord President.

56. The terms of reference of the Scientific Advisory Committee of the War Cabinet are as follows :

- (a) To advise the Government on any scientific problems referred to it.
- (b) To advise Government Departments, when required, on the selection of individuals for particular lines of scientific enquiry or for membership of committees on which scientists are required; and
- (c) To bring to the notice of the Government promising new scientific or technical developments which may be of importance to the war effort.

57. As the Minister responsible for the Department of Scientific and Industrial Research, the Medical Research Council, and the

Agricultural Research Council, and as the President of the Scientific Advisory Committee, the Lord President of the Council has, as a matter of administrative convenience, come to be regarded as the member of the War Cabinet responsible for the general oversight of the Government scientific organisation. This does not, however, in any way derogate from the individual responsibility of the other Ministers concerned for the organisations and establishments in their Departments.

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APPENDIX C

TRAINING FOR INDUSTRIAL MANAGEMENT

A public Conference was organised and held by the Institute of Industrial Administration in March, 1943, "... to discuss methods of education and training to ensure maximum efficiency in the management of our industrial undertakings, upon the successful conduct of which the welfare of the people of this country depends."

The Council of the Institute has generously permitted the reproduction in this Appendix of the greater part of the published Proceedings of the Conference. Broadly speaking, there were three main themes :

National Aspects of Management (pp. 338-355).

External Education for Management (pp. 356-374).

Internal Selection and Training (pp. 374-403).

Want of space has necessitated the omission of parts of the Papers and most of the interesting Discussions—for which the reader is referred to the published Proceedings—and in some instances the authors of the Addresses and Papers have slightly revised them since the original publication.

THE FUTURE OF INDUSTRIAL MANAGEMENT

By: T. G. ROSE, M.I.Mech.E., M.I.P.E., (*Industrial Consultant*)
(*Chairman of the Conference. Fellow and Chairman of Council*)

Since every man, woman and child in the kingdom derives his or her existence directly or indirectly from industry, the conditions under which industry is carried on influence our entire social fabric. Where industry is prosperous and working conditions are good, those who are occupied under these conditions have at least a better opportunity to create for themselves conditions of life which tend towards good citizenship. But where industry has collapsed or from causes of one kind or another has become inefficient or unfruitful, those who are occupied under those conditions are forced to narrow the circumstances of their lives until the standards which make for good citizenship cease to exist. If an example be needed of this we have only to look back with shame upon those districts of unemployment and misery which were known as the "Distressed Areas," grim monuments to the evils that can come from unrestricted individualism. To the vast masses of operatives, both clerical and manual, who carry on the work of industry, the management which directs their daily toil can mean a full life or an empty one according to the principles upon which that management is based and the practice which is adopted.

Those who have read Dr. Temple's brilliant pamphlet on "Christianity and Social Order," recently published as a Penguin Special Volume, will recollect that in it he points out that "management is fast becoming a profession, with its own standards and its

own objectives. Its primary interest is not dividends for the shareholders, but efficiency of service." Those of us who are or have been in the past managers are fully aware of the truth of this, and of the influence that our actions and decisions must have upon the lives of those who service with and under us. . . .

COLLABORATION IN MANAGEMENT

To this aspect of management there is the companion view—if the general trend of broad public opinion is beginning to swing across from regarding industry primarily as a source of private gain to regarding it primarily as a service to the community, how will the position of the manager in industry be affected by this change? It is not easy to manage an industrial undertaking, whether large or small. The life of a departmental manager or a managing director is seldom anything but a hand-to-hand battle with the remorseless pressure of decisions of every nature to be taken, policies to be thought out, plans to be laid, staff to be trained and directed, and problems and difficulties of every kind to be dealt with, from morning to night. The people who talk glibly of management inefficiency are usually those who have never had to carry any management responsibility themselves, and who do not realise that many occurrences in industrial undertakings for which the management is blamed, are beyond the power of the manager to prevent. But whatever the difficulties may be with which the manager has to contend, it can be said for him that as a class he has come to realise clearly during the past fifteen years that the old days when the operatives were described as "hands" and treated merely as human machines have now passed for good and all. To-day, in this country at any rate, it is well understood by the vast majority of those who are in responsible positions that industry, to be efficient, urgently needs collaboration between the manager and the operatives, and that the position of the manager carries with it the responsibility of possessing the knowledge of how to manage.

I think that all of us who study industrial management realise either consciously or unconsciously that difficult days lie ahead. Recent Government labour legislation has, on the one hand, weakened the manager's authority, and, on the other, encouraged the operatives to develop a critical attitude towards the management of the undertakings in which they work. In so far as this criticism is directed to matters affecting production and working conditions, it can be not only most helpful, but of real constructive value in developing a spirit of co-operation which ought, if encouraged, to raise to a considerable degree the overall efficiency of the normal industrial concern. But there is a small section of the operatives who believe in Communist principles, and whose admitted aim is to achieve workers' control of industry, pointing to the remarkable results that have been obtained in Russia as the justification for their policy. I feel that we, as managers, ought to recognise the danger

of this, and be prepared to meet it. If we ourselves are clear in our own minds what the fundamental laws of management are, and how it is only by their recognition and application that industry can be carried on, we shall be able to oppose an effective resistance, not to well-regulated changes which make for the general good of society, but to demands for changes which, if carried out, might well bring the whole structure of industry tumbling about our ears.

THE RUSSIAN EXPERIMENT

It is always difficult to appreciate current events at their true value. In management, as in most other human activities, we are apt to overlook fundamental movements that are occurring around us on account of the distractions from minor events which affect us more at the moment. I have felt for some years that we in this country have paid far too little attention to the remarkable experiment in industrial management which has been going on in Russia for the last twenty-five years, an experiment which, in my opinion, is just as worthy of careful record and step-by-step analysis as the production experiments of F. W. Taylor in the last twenty years of the nineteenth century. For an experiment it has undoubtedly been, and not on a laboratory scale either. It has been a 100 per cent. nation-wide affair, and we are therefore, I suggest, justified in giving full weight to the results obtained in the course of it and the position so far reached.

It is true that the course of this experiment has been difficult to follow, and in addition there is an added factor not usually found in management problems—the political aspect. In recent years, however, much more information has become available through the books of Mr. L. E. Hubbard and other writers, and it has been possible to piece together the story in a more or less connected and analytical manner and to draw lessons from it. Very briefly, this is what seems to have taken place :

After the Russian Revolution had broken the power of the Tsarist Government, the Central Committee of the Communist Party issued a Decree on 27th November, 1917, establishing control by the workers of all the activities of industrial undertakings. In other words, with one sweep of the sponge the Communist Government wiped the management slate clean and started again from the most elementary basis of directing the activities of a community—that is, by debate and decision of the members of the community itself. Now it should be borne in mind that in the year 1917 industrial management had scarcely emerged as a science in itself. In America courses in business administration had, it is true, existed for some time, though these were more devoted to the development of functional technique than to the study of general management and the control of an undertaking. The general management of an enterprise both in America and in this country was, as one might say, taken for granted as the natural duties of those in the senior executive positions, who directed operations so as to get the work

done in the easiest and most profitable manner. Little was known in those days of Henri Fayol's work in the administrative field, whilst F. W. Taylor's development of the functional aspect of production had not so far been applied to the general management of undertakings, although the management functions as we know them to-day were, of course, all in action to a greater or lesser degree, or those undertakings could not have been carried on. The production, distribution, accounts and finance, and legal and secretarial functions were all at that date fully recognised. The other three—development, personnel and industrial relations, and general management—did not emerge as primary functions until some time later. The personnel function came to recognition in this country largely through the work of the Institute of Labour Management in the 1920-30 period. Development, as a primary function of management which must be implemented if an undertaking is to be carried on successfully, was not effectively recognised until some years later, whilst the co-ordinating function of general management is only slowly emerging as a recognisable specialised activity with defined responsibilities at the present time.

The fact that the Communist Party swept the board as they did and deliberately ignored the existing industrial structure of capitalist countries was probably because Lenin in his earlier writings had made it clear that in his opinion the management of industry in a Communist State presented no problems. He said that capitalist methods had reduced the management of an undertaking to a mere matter of book-keeping which could be carried on by any person having a little experience in the handling of figures. It is also likely that the strong tendency to bureaucracy which had always been a feature of industrial and Government organisations in Russia had tended to give operatives in the workshops the idea that the management of an enterprise was merely a matter of the exchange of documents. Moreover, the liquidation of the employer-owner-manager class, and the refusal of the manual operatives in the factories to recognise that the clerical operatives played any part of constructive value in the industrial structure, left a completely clear field for the experiment in the management of the national industry, with the manual operatives in complete control to start from absolute zero.

THE FIRST MILESTONE

In January, 1918, the first Russian Trades Union Congress was held, and it was then laid down that the main task of the Party lay in the field of economic organisation of production and labour: it was also recommended that all industrial undertakings should be formed into trusts, managed by factory committees elected by the employees. The complete chaos brought about by unrestricted "workers' control" had demonstrated, even in the short period of two or three months that it lasted, how entirely impossible it would be ever to manage industry by this means. This, I suggest, is the first striking lesson that the Russian experiment has taught the

world, and deserves the fullest publicity. As it is, few people seem to recognise its importance. Less than six months ago I was present at a conference at which an obviously earnest and sincere Secretary of a British Trade Union said during his speech that he was afraid he had to admit that the ideal days when workers' control of industry would become a reality were still a long way ahead in this country. The fact that true "workers' control" lasted less than three months in Russia, where it had every possible facility for development, must obviously have been unknown to him.

From 1918 to 1920 Russia passed through the period of what was called War Communism. The whole of industry had been nationalised under the Decree of June, 1918, and, therefore, since all industrial enterprises became State property, all industrial workers became employees of the State. During the two years of War Communism Russia was torn by the struggle of the Bolsheviks against the Mensheviks and White Armies, and the normal processes of industry would have been difficult to carry out even under efficient management. As it was, industrial organisation and discipline deteriorated to an alarming extent, and these two years are sometimes known as the "petrol-lighter" period, owing to the fact that so many of the operatives, having nothing to do, spent their time making odds and ends for their own use.

THE SECOND MILESTONE

In March, 1920, the Ninth Party Congress was held. Lenin, who was never afraid to change his opinions when common sense showed him that he had been wrong in the first instance, now boldly laid down—in theory at least—the principle that a single responsible manager must in future replace the committees of management in State enterprises. He pointed out that whilst in the future the operatives must produce and train managers from their own ranks, for the time being the urgent need for individuals capable of managing undertakings must be met by utilising such of the managers of the old regime as still survived. A special Commission, appointed to examine this problem, submitted to the Congress a choice of four methods by which the principle of single management could be established and at the same time the party principles could be preserved from possible sabotage by individuals who still possessed the old industrial outlook. The four proposals are interesting. They were :

(1) That a director of sound political principles should be appointed from amongst the workers and have an expert "bourgeois" engineer to assist him in his decisions.

(2) That a "bourgeois" engineer should be appointed as acting manager with a works commissar to supervise his actions.

(3) That a qualified specialist should be appointed director, having with him one or two workers to assist and supervise him. (This presumably refers to the old-time director not qualified technically as an engineer but accustomed to the administration

of an undertaking, the assisting workers being men/ experienced in the technical side of manufacturing.)

(4) That the existing collegiums or boards should be maintained, but with a strengthening of the authority of the president, whose decisions should direct the undertaking.

This is, I suggest, the second milestone in the Russian experiment. It seems to imply that during the War Communism period, when industry had been trying to function under Factory Committees, the inefficiency had been so great that individuals with management experience had by degrees been brought in to assist, thus changing the Factory Committees into collegiums or boards on pre-revolution lines, though naturally with a very different composition. The term "collegium," which corresponds to what in this country is called the Board of a Company, is a very old one in Russia, and those who have read and enjoyed Gogol's *Dead Souls* will recollect that the hero, whose entertaining adventures in pursuit of his unlawful scheme make up the theme of the book, always described himself as a collegiate counsellor, much in the way that certain shady individuals in this country describe their occupation as that of "Company Director." The Russian pre-war management structure was, therefore, after two and a half years already beginning to make its reappearance, in spite of all efforts to find an alternative.

In March, 1921, the War Communism period ended and Lenin introduced the New Economic Policy, which re-established in some degree private enterprise. This caused fierce dissension in the Party, but Lenin, who was always practical in handling the vast problems that the Revolution produced, recognised that only by that means could the industrial life of the country be made to revive. Time was needed to train the new managers who were to rise from the ranks of the operatives. Industrial management had proved after all not to be a matter of mere book-keeping, and the only way out of the existing muddle and shortage of goods and services was to encourage private enterprise to return and take charge, even if only for the time being.

SINGLE MANAGEMENT

In 1923 the first Constitution of the U.S.S.R. differentiated between the administrative functions of the collegium and the executive nature of the manager's job, and during the seven years that the New Economic Policy was in force the operative's voice in management affairs came to have less and less influence, whilst the authority of the manager began to be re-established. The Factory Committees and their conferences still existed, but the decisions of such committees were now merely recommendations to the manager, and were not in themselves executive decisions. Industry revived in a striking manner, but at the cost of the abandonment or postponement of much that was recognised as forming the foundation of Communist theory. By 1928, however,

Stalin had assumed control of the situation. The New Economic Policy period was brought to an end, and the first Five-Year Plan began in October of that year in a furore of propaganda. Tremendous pressure was applied to industry, not only in order to provide the capital developments which Russia so badly needed, but also in order to increase as rapidly as possible the industrial Proletariat which up till then had only formed a small proportion of the Russian population.

In analysing the Russian experiment in industrial management, it must be borne in mind that single management is in essence directly opposed to pure Communist theory. All through the past twenty-five years of development can be traced the swaying struggle between the demands of certain political doctrines and the unavoidable conclusion that in practice those doctrines did not work. The abolition once again in 1928 of private enterprise, an action which brought with it an up-spring of political fervour and the immense propaganda that heralded the first Five-Year Plan, led to a renewed attempt to reintroduce committee-control of management, in spite of the fact that the principle of single management was still on the Statute Book. During the first Five-Year Plan the managers of industrial undertakings went through a very difficult period. They were subject, amongst other things, to examination by what were known as Cleansing Commissions, which came to a works and held open sessions compulsorily attended by all the employees, who were encouraged to criticise the actions and behaviour of their manager from any angle they pleased. Groups of young Communists would pay surprise visits to concerns to investigate the manager, though whether the investigators had any knowledge of management or not did not seem to be taken into consideration as long as they stood well with the Party. The operatives began slowly to take back control once again, and this led to those in managerial positions defending themselves by the only means left open to them, which was to take cover behind the smoke-screen of bureaucratic inertia, based upon the most meticulous compliance with every existing regulation and order affecting industry, combined with a refusal to exercise any initiative whatever.

The national economy, which had begun to pick up again during the N.E.P. Period, slid once more rapidly downhill, and in 1931 Stalin, when addressing a conference of economic advisers, criticised severely the conduct and organisation of industry. He laid down six guiding conditions for the management of enterprises, and the sixth condition was that such enterprises must be administered by single responsible heads. After this, there came a period in which labour legislation dealing with working hours, absenteeism and so forth was tightened up to a remarkable extent. I do not wish to deal with this side of the Russian experiment to-day, but a study of the laws promulgated will show that the operative was left very little personal liberty if the regulations were properly carried out. The Cleansing Commissions were abolished once more, and the collegiums or boards instructed to be less critical and more constructive.

THE SECOND FIVE-YEAR PLAN

In 1933, two years later, the second Five-Year Plan started, and it would seem that from this period onwards industrial management began to approximate more and more towards the framework that it has in "Capitalist" countries. By this time, thirteen years since Lenin had called for a new manager class trained from the ranks of the operatives, the technical colleges were rapidly turning out men qualified in the different professions, and great numbers of these were given the direction of industrial undertakings straight from college. To us this may sound strange, but it must be remembered that many of the students who qualified were Stakhanovites of mature age (thirty-five or so), who had lacked a theoretical training. Having passed through a technical college course, such a "student" would return to industrial life with a background of practical experience already achieved, although in all probability his management experience would still have to be gained.

During the second Five-Year Plan the political element was still in the ascendant, in spite of the lip-service paid to single management, and since the training of the younger generation in Communist principles still maintained the pure doctrine and so minimised the function of management in comparison to the function of manual production once again, the Communist die-hard element endeavoured to re-impose "workers' control." In 1939, the Eighteenth Congress of the Communist Party gave to primary Party organisations the right to supervise the activities of the managers of industrial enterprises, and for the second time district Party Committees of keen young Communists began to interfere in the management of concerns in their district, in some cases going as far as actually to dismiss the managers. It is interesting to note the reaction to this. By now the managerial class in Russian industry had established itself sufficiently to make a strong protest against this outside interference, and there were a number of cases of requests to be allowed to resign rather than be frustrated by ignorant young busybodies. This time the managers won their case.

THE THIRD MILESTONE

In July, 1940, the Plenary Session of the Central Committee of the Party agreed that interference by the local Party organisations had never been intended and should be suppressed. All that the Eighteenth Congress had had in mind was that local committees should give help and advice where needed. Here, therefore, we have the third milestone in the Russian experiment, the point at which the fact that the manager must not be interfered with by third parties, but must carry the full responsibility for managing his job, is made clear and admitted again by the National Government.

FURTHER DEVELOPMENTS

From 1940 onwards the management structure appears to have come continuously closer to the normal state of affairs as we know

it in this country to-day. I do not think that we should allow the fact that industry is owned by the State to draw a red herring across our management-experiment trail. In the U.S.S.R. industry is divided into Commissariats, each having a number of chief Administrations or Departments, each of which in turn controls a number of Trusts, each of which in turn is composed of a group of factories. As a nationalisation of industry the structure is perfectly sound. Since there is no competitive distribution, the head office of the Trust, as instructed from the Chief Administration, specifies the product to be made by the factories, arranges for material supplies, and gives delivery instructions. The factory managing director is left with the internal organisation only; he has to produce the goods in the right quantity and quality at the right time and at the right price. His management problems, therefore, are very much what they are in this country. On the face of it he would appear to have a simpler task, for :

- (1) His finance is found for him.
- (2) His material is supplied to him.
- (3) His sales range and specifications are settled for him.
- (4) His customers are indicated to him.

But in each case a considerable proportion of the responsibility of the function remains for him to handle. His bank will still make trouble if he oversteps the planned finance limits; his material supplies may be very unreliable in quantity and quality; he may still find it difficult to reach the standard of finish demanded in his goods; and finally his customers, though he has not had to find them, may be just as troublesome as in the commercial field. So that it would appear that the managing director of a Russian State enterprise has just as much need for management as his opposite number in the "capitalist" countries, with the knowledge looming in the background that if he fails it is himself and not his company that will be liquidated. The items of which he has been relieved merely have to be handled by the head office of the Trust. Thus though circumstances may differ, the full range of management responsibilities is still there and has got to be dealt with efficiently if industry is to function satisfactorily.

WHAT THE EXPERIMENT HAS PROVED

It is obvious from articles in journals such as *Pravda* and *Planned Economy* that there is still much that Russia has to learn with regard to industrial management, and there would seem to be a number of armchair critics who show more enthusiasm for Communist theory than practical knowledge of the problems of a manager. But from all the welter of innumerable changes and alterations over the last twenty-five years, the fact seems to emerge that if Russian industry was to be efficient, there was only one course to adopt—and that was to return to the management framework which has been built up by a century of trial and error in other countries. In other words, the Russian experiment has proved

that the functions of management are inescapable; and no political doctrine can find any satisfactory alternative method of implementing those functions to that for which this Institute stands.

I want to emphasise that I have tried to make this brief survey of the great Russian management experiment as an analysis of actions and reactions, and not in any spirit of criticism. In fact, I feel the conclusion reached shows that only a hard-headed sense of realities could have discarded hampering theories and achieved so large a measure of success in so short a period of time. In my work as a consultant I am accustomed to differentiating, when diagnosing a client's problems, between what I term "factors of temporary inefficiency" and "factors of ultimate failure." No doubt in the Russian industrial structure there still remain many of the former, such as excessive establishment charges, low quality standards, and the need for general tightening-up of those aspects of industrial efficiency which are normally taken care of by the requirements of competitive distribution in a "capitalist" economy. But when we consider the amazing performance of our Russian allies in the struggle against the Nazi-Fascist domination it is difficult to believe that there can be any factor of ultimate failure present, or it would have shown itself long ago. With the political side of the question we are not concerned here—only with the management of industrial undertakings—and no nation could have undertaken the transfer of so many factories to the east, nor the transport organisation involved in supply, nor the high-pressure output of war-munitions of every type, with such conspicuous success, without good management behind it.

THE FUTURE OF BRITISH MANAGEMENT

I have taken as the theme of my address the history of the great Russian experiment to-day, because I feel that we have been, and still are, far too complacent over the future of industrial management in this country. We hear on all sides that the existing structure of industry will have to undergo modification in the near future, and we have amongst us every shade of opinion on the subject, from the most ferocious Communist whose ideal is immediate workers' control of the whole national economy, down to the most pronounced individualist who would rather close down his works than accept even the most harmless suggestion from any of his employees. Somehow, we in England have to find the middle way, the *media res tutissima*, by which we can bring about the needed changes, and yet preserve in our industrial structure so much that is good which has evolved through the slow centuries in the general movement towards the betterment of the standard of living and the social conditions under which the nation lives. To this that is good, I feel, we must add what we can of what is fundamentally sound of the newer vision, the recognition that industry should be primarily a social service, and that whilst the profit motive is not in itself a bad thing, it can be used to do harm as well as good. This country has been backward in the past in recognising the need for training in industrial

management. With the rising tide of criticism from that vast mass of operatives who spend their lives in managed organisations, there is a time coming upon us when we shall be called upon to answer for what we do and how we do it. There is to-day the most urgent call for recognised principles in management training. We cannot afford to wait until the war is over. We have lost too much time already. Many of us present to-day will look back with bitter regret upon the efforts that have time and again been made during the last fifteen years to obtain recognition from industry of the fact that management is both a science and an art, and that a man who manages in industry should be as qualified for his work as a doctor or a barrister. It is no use regretting wasted years now. The only thing to do is to buckle down to the problem, to see where we are going before it is too late, and to create something of constructive value upon which future development can be built. We do not want to see well-meaning but ignorant people clamouring for the introduction in this country of management control methods which the Russian experiment has clearly shown to be harmful, and which have been already abandoned in that country. We need a clear-cut line of action in the training field which will commend itself to industry, and to those who will have to guide the future prosperity of the nation. . . .

MANAGEMENT AND THE NATION

Address by: HIS GRACE THE LORD ARCHBISHOP OF
CANTERBURY

The effect of war upon this problem, as upon so much else in national life, is to accelerate processes which were already observable. It is very rare that during a war anything truly novel is undertaken; because what is needed is to adjust existing machinery in every sense of the word to war needs, and that must be done in conformity with ideas sufficiently prevalent for people to be able to accept the new suggestions and act upon them. The scale on which many of the enterprises are carried out, or some of the changes carried through, may be in itself novel, but it is novelty of scale rather than of substance that appears in war. That is much the same as saying that what war does is to accelerate the movement of affairs which is already discernible, and certainly the war has brought to the forefront the problem of management; it is inevitable that we should be profoundly interested in efficiency of management in the fullest sense of the word "efficiency." But already before the war many observers were ready to say that management rather than ownership was the key point for those who are concerned with the welfare of industry and its relation to the community.

There has been much discussion on the effect of private ownership upon production and the distribution of products, but that is a relatively unimportant matter as compared with management. At an earlier time, ownership and management were intimately connected, and that remains true over a fairly large part of the

industrial field, especially where the number of men employed is comparatively small; but it is evident that the presence of managerial capacity in the owners of capital, whether by that we mean shares or fixed capital, plant, etc., is rather accidental. That did not very much matter in the earlier stages of industrial expansion. If a man had the opportunity to start a small factory, and he had managerial skill, he would make a success. If he lacked it, then his enterprise would fail, and not very much damage was done. He himself would go back to the ranks of the workers, and his employees would themselves fairly easily obtain employment elsewhere soon. In the early days there was the frequent spectacle of the founder of a business passing it on to a son who maintained it, but had not the enterprise of his father and passed it on in turn to his own son, who had neither enterprise nor interest and let it sink into something comparatively small or disappear altogether. In the North of England they used to say "clogs to clogs in three generations." At that time the quality vital for development was initiative. Although the morals of the situation were those of the jungle, the expansion of industry did go forward under the control of those jungle laws more rapidly than in any other way. Looking back, a slower development with more consideration would have been better. We are now vividly aware of the appalling human evils that did accompany that great industrial expansion, but they were a price paid for a more rapid rise in the standard of living than has ever taken place. Whatever criticisms we may have to make of the methods then employed, it cannot be said of them that their result was to depress the standard of living. At a cost of great human suffering they raised it. But those same principles which were most appropriate in the days of the starting of small businesses which grew into great ones cannot be applied to the great concerns with which we are familiar nowadays. The interest of the community itself in the production of these great concerns is such that we cannot contemplate failure, and the number of persons employed in them is so great that if there should be failure, the social dislocation which would result could not be tolerated.

Secondly, the scene of interest has been shifted, and, in response, there has arisen a new factor—namely, managers who are not owners, or members of owning families, but qualified by their own talents for what is now by far the most responsible task in the community. It has grown for a long time, but, as it is now, the profession of management is a relatively new factor. With the rise of the professional manager, of course, the owner must sink into the background.

With regard to big concerns, the owners are the shareholders who, in fact, normally exercise no control whatever upon the conduct of the business. They cannot know enough about it. As a rule they are unorganised, and, therefore, could not give effect to their wishes even if they had any. Forty years ago the Christian Social Union used to urge upon Christian shareholders that they should attend shareholders' meetings and press for the proper treat-

ment of the workers employed. Of course, that was right in principle, because ownership should always be coupled with responsibility, but it was impracticable, and now owners do not, as a rule, seek directly to influence their business. Boards of directors are very largely co-opted; and it is much better thus; and, therefore, their supreme responsibility is to find the best manager, to whom the main responsibility belongs. What is the professional interest of this new and immensely important section of the community? It certainly ought to be, and nearly always is, efficiency of service to the community. The main concern is efficiency of actual working, and so it ought to be, because that is the primary requisite; but it is efficiency in providing the community with its needs, and therefore is always an efficiency of service, and the service is rendered to the community as a whole, although perhaps that becomes vividly apparent only in war-time. In other words, the interest of the manager, the personal as well as the professional interest, is, to some extent, artistic and creative. He is not mainly concerned with any personal gain to himself other than the satisfaction of seeing good work well done. He has not got the pecuniary motive to any high degree. He is working at a fixed salary, as a rule; and though, no doubt, the prosperity of the business is indispensable to his financial position, in a general sense the fluctuations of that prosperity, within limits, do not directly affect it; therefore, the whole direction of his attention is upon the efficiency of the service given. He is in the position of someone carrying out a great task in the most admirable manner that he can, for the sake of his own satisfaction, which may not be identical with the financial interest of the owners. He will have an interest in profits, as a measure of efficiency, but not so much as a source of dividends. To me it appears that this outlook of the profession of management is to be welcomed, and so far as there is conflict between this natural interest of the manager and the technical obligation to the owner, encouragement should be given to his natural bent. In all personal interest he stands with all others who are engaged in carrying on the work rather than with those who hope to derive from it a return upon capital invested.

With the emergence of the manager into the foremost place, the motive for profit-seeking goes into the second place as compared with efficiency of service. There is an emergence of real, ethical advance in the whole structure of industry. As with all human things there are some accompanying risks. There is no doubt about the tendency of some of the factors contributing to the social order which we must expect to see; and the danger of this exaltation of the manager is what is commonly described as bureaucracy. It is better than plutocracy or mob government, but it may easily be the enemy of that development of responsible citizenship which is the issue of full democracy. In all human situations there is always a special danger present that is relative to the particular situation into which we are passing. There is no need that we should fall into the danger, or that the evil should become actual; and if managers are really sensitive to the interests of those who work in the businesses

which they control, the danger will always be avoided. All this gives great importance to the recruiting and training of managers. The two cannot be separated, because there will always be need to look for men of leadership in all ranks of those who are employed, so that they may be led forward towards management; but the question of general education here assumes very great importance. No doubt the manager should be acquainted with the workings of the machinery used in his business, but it is still more important that he should understand the men themselves. One great captain of industry (W. L. Hichens) maintained that he always wanted men who had taken Greats at Oxford, men who had studied history and philosophy. What he wanted first and foremost was trained minds, sensitive to human feelings and human aspirations.

We have tended to leave this vital matter almost out of sight. We have assumed that it requires careful training to manipulate complicated machinery but no training at all to manipulate a whole team of human beings. Leadership can be developed by appropriate training, and that training comes partly—mainly, no doubt—through living together in a community such as a boarding school, but partly also through the exercise of the mind upon human aspirations and endeavours. Of course, the technical qualifications are necessary, but they are no more necessary than human qualifications, and the higher you go the more important do the human qualifications become. Before the last war, our education was exceedingly defective on the scientific side. There was not any training of a large number of competent people in scientific subjects. There has been a phase of development of secondary education since the last war. To an immense extent it is scientific in character and quality. The methods of the sciences are, for the most part, wholly inapplicable to human relationships. The methods of the natural sciences are those that are employed in the laboratory, and the manager must have the kind of quality which they tend to develop. He must understand the value of absolute precision, of absolute correctness in dealing with weights and measures, and the like; but that will not help him to control his foremen or his workmen behind them.

I want to make a plea for the element of humane education of a considerable proportion of managers who will bring back its influence into the whole fabric of industry. It is not necessary that everyone should go through the full training, though that would be ideal provided there could be enough managers who would respect the vital link between industry and community. Upon this will depend the effectiveness of industry in the service to the community, and the cordiality of relationship between this great section of the population and all other sections. More and more industry has become one of the major factors in the life of our nation—meaning by industry, all that goes on in the factory and workshops as distinct from agriculture. It is quite clear that the health and happiness of our people, its vigour as a nation taking its place—and it must be a most responsible place—in the fellowship of nations

in the world, must largely depend upon the human relationships that are established within industry, and between industry and the rest of the community; and, for both, the key point is to be found in the profession of management.

EXTRACTS FROM THE DISCUSSION FOLLOWING THE ADDRESS

MR. GEOFFREY MARCHAND said: All that His Grace said is highly applicable to big business, but I am not so sure that it is applicable to small business. The majority of businesses in this country are small, and there is great difficulty in finding and training managers with the same sense of service in these small businesses as one finds in the large. While I agree generally that managers to-day wish to see good work well done, it is the case that, high though their motives are, the personal remuneration motive still plays a very substantial part, and I am quite sure managers have not yet reached that stage of ethical consideration for their job which His Grace desires and which we all desire.

We have largely the co-opted board to-day—but we are inclined also to have the professional managers who have found for themselves a place on the board and become a professional board, and when you reach that stage you are getting near the bureaucratic condition that is so dangerous, or is thought to be, not only in the Civil Service and local government service, but in social service at the present time.

I agree entirely about the need for training managers of the future in the humanities. There is a very real danger of creating a too technical management class. I believe that if you can insist all the way through on adding to the high technical knowledge that broad basis of the humanities to which His Grace has referred, we are well on the road towards creating a class of managers who will be of the utmost service to the community and to the world.

MR. EDWARD MEIGH said: I doubt whether managers, much less the public, have yet visualised the adjustment in industry which will have to take place with the rebirth of education which is impending, when industry will have to face the fact that it cannot employ children of fourteen, but will have to wait until at least they are sixteen, and then give them facilities for part-time education to eighteen. When management is established as a profession with a large element of training in the humanities, we shall be better able to benefit from that position.

MR. COMYNS CARR, K.C., said: With regard to the small businesses, I think we are apt to forget—and it is one of our great difficulties in deciding how management may be taught—that in spite of many great businesses England is still primarily a country of the small business, and in the small business management and ownership are necessarily more closely connected than in the large one, as a general rule. On the technical side there are difficulties in applying to the organisation of small businesses the principles of organisation which are necessary and can be worked out for large ones, although

I think we have wisely devoted a large part of our attention to that problem and have been able to show how those principles can be adapted and used in small businesses. I feel there is no reason why those who are in charge of small businesses should not be able to look with more attention at those wider aspects of their duties, just as disinterestedly as those in charge of large ones.

With regard to humanities, I want to plead for variety, and I want to plead for it in two directions. In my humble opinion—having had occasion as a father to study the matter a great deal during the last thirty years—our educational progress has been marred by increasing over-specialisation. I think the humanities as taught in the day when I suffered from them, and even as taught to-day, are themselves an example of over-specialisation, and I think scientific education as given in our secondary schools and colleges is greatly over-specialised. I believe education in the schools and universities should be as general as possible, and that the student of the humanities would profit a great deal by knowing more about science, and *vice versa*. When you come to this question of what sort of training would best fit a man to handle his fellow men, I do not think anybody can really understand or fully sympathise with any class of men until he has worked with them in the shops. However much one might try to sympathise, there is a barrier erected by long-continued specialised education which makes it very difficult afterwards to get on absolute terms of equality and familiarity with those who have not enjoyed those advantages, and I believe for the potential manager a course of really working with his men is just as important as any education that can be given in schools and colleges.

I want to see the class of managers open to recruitment from all sources, and our training has all along been directed to giving the opportunity, so that from whatever source a man may have got his knowledge or experience, our training is open to him, in order that he may add to his professional experience and training the special technical qualifications a manager requires.

It is true that the boarding school does give an opportunity of developing leadership which you do not get in other ways. I think it is most effective. I want boarding school education to be available to all who want it and are likely to profit by it.

HIS GRACE, replying to the discussion, said: The main points that have been brought up concern the small business, and the question of education. I did know, of course, I mentioned, that what I was saying was primarily applicable to big businesses. It must be there that we get our basic principles most fully worked out to begin with. The principles should be worked out there and then applied to the small businesses. Managers should not be selected from one class of society. Broadly speaking, it is true that the boarding school does give those qualities for leadership which you get in no other way, therefore boarding schools should become universal. Whatever talent is found for management, that talent should be given a chance of developing.

MANAGEMENT AND INDUSTRY

Address by : MR. A. S. COMYNS CARR, K.C.

(*Fellow and Past-President. Chairman, Bristol Pneumatic Tools Ltd., etc.*)

I want to talk to you to-day about the opportunity and responsibility of management in the years following the war, particularly of the problem of post-war employment (not unemployment, as some people would speak of it). I have given much thought to this question. In my opinion, the problem of employment after the war is going to be how to find enough people to do the work, not how to find enough work for the people to do, and that is the natural state of affairs.

Trade is exchange. The nation that will not buy, neither can it sell; therefore, the nation that will buy can always sell, but it must sell at a price.

There are two kinds of competition, the obvious and the invisible. One kind is that of suppliers of the same thing competing against one another to secure the customers who want that thing. The second kind is that of suppliers of different goods or services competing for the total amount of purchasing power available at any given moment.

Now let me say why after the war there will be no such problem as unemployment, but on the contrary, the problem will be to find people to do the work. There is the question of repairing the ravages of war. Then we have got to make good the wear and tear due to the fact that during the war we have not been able to do normal repairs and maintenance. Then we must supply and renew our stocks. Almost every country in the world, even if it is neutral, or by reason of its geographical situation is spared the immediate ravages of war, is more or less in the same position.

Before the war our imports were paid for from a variety of sources. A large part were paid for by the earnings of our shipping and foreign investments (which have almost disappeared into thin air). Our shipping has suffered serious ravages. The imports we need have got to be paid for. There is a unique opportunity for our manufacturers for export to produce the goods to be sent abroad to pay for what we must buy. If we are going to produce all the extra goods wanted due to all the causes I have enumerated, we shall need more raw materials which come from abroad.

An interesting point is the distribution of the various items in our national production as a whole. In the immediate pre-war years the total value was split substantially in the following way :

20 per cent. of this cost was represented by raw materials, partly manufactured goods for use in further manufacture, and fuel imported from abroad. 12 per cent. of it was raw materials, fuel and power produced at home. 36 per cent. of it was wages at all stages of manufacture; and 32 per cent. was overheads and profits.

So you see the more we make, the more we produce, the more we have got to increase that 20 per cent. which consisted of imported raw materials and partly manufactured goods, and the more of these we import, the more we have got to export to pay for them.

People do not realise that employment pays for itself. To take an example : If the unemployed of 1935 had been employed, there would be at least £122,000,000 in excess of their wages over their employment pay as additional purchasing power, which could have been used in buying the goods which they would have produced. This inter-war unemployment was really due to an inferiority complex. It averaged about 14-15 per cent. during the period between the two wars. Before the last war it only averaged about 4 per cent., and in many of the years before the last war and in the years immediately after the last war, it was under $2\frac{1}{2}$ per cent., and that is what it ought to be, and that is what I mean by a state of really full employment— $2\frac{1}{2}$ per cent. against the 15 per cent. of that miserable mis-managed period between the two wars, and, moreover, $2\frac{1}{2}$ per cent. as against 10 per cent., which is the figure on which the estimates in Sir William Beveridge's report are based. If I am right in saying that it never need be more than $2\frac{1}{2}$ per cent., then you save on Sir William Beveridge £90,000,000, which is more than the amount by which he estimates the contribution of the national exchequer would have to be increased. That is to say, the Beveridge report need cost the taxpayer nothing. Finance must be our servant, and not our master.

I want to say a word about the economics of post-war lease-lend. After the war the necessity for physical reconstruction will be just as great in every other country as here. The difficulty will be that some of them cannot pay for it. We have got to make our contribution towards that problem and work harder than ever, because there is no way we can contribute to it except by supplying these countries, particularly allied countries, with some of the things they will need. We must realise that the economic prosperity of the world depends upon the economic prosperity of all. As long as we can consume all we can produce, this involves some sacrifice, but if there is danger of unemployment it will actually pay us to supply these people.

The responsibility upon managers is going to be different from what it was. Some people think that the shareholders always got the best of things ; but there were years when the shareholder got nothing, and sometimes had to pay for wages out of his pocket year after year. I think both the manager and shareholder who succeeded in keeping businesses alive are deserving of thanks from the community, but after the war the problem for the manager will be, as it is now, to get the utmost production that he can.

There will be fewer people available after the war, and industry will be affected by the raising of the school age, and will have to be reorganised.

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PART-TIME COURSES IN EDUCATION FOR
INDUSTRIAL MANAGEMENT

By H. W. BROADBENT, M.Sc. (Eng.), B.Sc. (Hons.), M.I.Mech.E.

(Fellow. Principal, Enfield Technical College)

I have only laid down principles—there has been no attempt to suggest definitely what should be contained in any course which may be taken, but I do feel that the only solution to our problem is a part-time education that is going to cover a long number of years. There was reference to the trend of movement away from capital and labour to management and labour, and, in my opinion, managers have not been trained for the job. On the other hand, if we are to obtain full co-operation from the labour side, we shall need to change our educational outlook since the trade union leaders, as well as the so-called rank and file, will also need to be educated in the new management technique. Reference was also made to the training of personality and character. Under present conditions—not necessarily war-time conditions—we have not got time to provide for all those humanities that we ought to provide. In the main, basic training should be carried out during what is now considered to be a normal working week, leaving the time available for our educational institutions to organise courses and activities which will meet the varied demands of those individuals who wish to avail themselves of such courses. There is no limit to this development. Hence, in relation to the general social problem involved, and the particular educational policy to be adopted to give this unlimited development, part-time day release of employees of any age is the only policy which will give the necessary results. The whole process is one of long-term policy, and operates well in practice.

INTRODUCTION

A great defect in our social system is that rather more than 70 per cent. of the children of the nation are withdrawn from the influence of systematised education at the age of 14. This will soon be remedied by raising the normal school-leaving age to 15, or even 16. It is difficult to see how the raising of the school age itself will solve our educational problems, but it is clear that something should be done to provide the facilities of study to the main mass of the population. Education is a continuous process, and consequently demands a review of the whole field, if any real meaning is to be given to a planned reconstruction after the present upheaval in world affairs. With regard to our particular problem, it is considered that 18 is the minimum age at which any attempt should be made to provide preliminary education for ultimate posts of responsibility; and even at this age the subjects to be included in this preliminary stage would be rightly described as background

subjects. This is justified, surely, by the fact that young people below this age cannot have had the necessary experience in life to make a judgment or to benefit by the type of training required in industrial or business administration.

SUGGESTED SOLUTION OF THE PROBLEM

The majority of young people could still be exempted from full-time attendance at school at 15 or 16 years of age so long as they are provided with a carefully planned part-time education on a sandwich system. In most cases it is considered that such a system should be applied in its integrated form on a weekly basis, where the working hours of the week are divided between education (formal instruction) and training (during their occupation or employment in commerce or industry). I cannot do better than quote the recent T.U.C. memorandum. "Industrial questions should not be allowed to determine educational policy. Let the greatest possible educational advance be secured; then let industrial practices be adapted to the new educational situation." The adolescent up to the age of 18 (at least) should be regarded as a "ward of the community," and his welfare, education and training would be supervised and directed by the education department acting as agent for the community, together with representative bodies of employers and professional institutes acting on a regional basis.

Another modification to our present system is contemplated in the provision of Day Continuation Schools, where the young person will be required by law to be in attendance up to the age of 18 for two days per week. Here is a great opportunity for experiment and research, but it will necessitate immediately the provision of suitable buildings by conversion of present ones, or preferably new types. Sufficient facilities must be found for outdoor activities of all kinds, and a new atmosphere must be created in connection with educational development. Again I quote from the above memorandum. "From the point of view of the training facilities to be given to, and the experience to be gained by, the young worker, it may often be desirable that he should not be bound to a particular employer. The alternative would be to bind apprentices and trainees to the joint body responsible for the training schemes in the industry concerned. This would enable young workers in training to extend and specialise their studies and to be transferred from one employer to another as might be desirable in the course of their training. Where there are recognised training institutions, such as specialised training schools, the trainee might well regard the school as his "home base." Thus the present practice of employers allowing apprentices to go to school would be reversed, and the schools would allow apprentices to go to employment." Training connotes selection for the purpose, and from the work record of each trainee it will always be possible to make such a selection at all stages of the process. Selection should be on a basis of suitability in all respects. This raises the question immediately of the type of training and basic study that should be given in the early years of the adolescent.

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TYPE OF TRAINING

In this section it is proposed only to differentiate between technical (in its widest sense) and administrative training for all executive positions (junior and senior). It is suggested that up to the 18-19 age group the training during work or office time shall be strictly vocational, and the present schemes operated by a great number of organisations and professional institutions or examining bodies will require little modification. The training is not necessarily centred in the local College, and wider use should be made of industrial and commercial premises for such Courses. It is not generally realised that such schemes can be incorporated as an integral part of our educational system under the auspices of the Board of Education, but this is the case at present.

The initial development of the trainee will be on a functional basis, and the instruction may be strictly described as mainly educational in its outlook at this stage. The further development will have as its object the interpretation of experience in the exercise of responsibility, and the crystallisation of personality and character. This process has been described as Training in Management. Thus our scheme will be objective, and the present so-called introductory Courses at the student stage entirely removed from the system.

SPECIFIC TRAINING SCHEMES IN MANAGEMENT

Our datum level is now fixed and the main problem can be considered in detail.

(A) *Supervisors, Foremen and Forewomen*

- (a) During the transition period it will be necessary to train the supervisors of some years' standing in industry. This is a special problem since they may have accumulated a wide and varied experience of technical work and the management of men. It is suggested that :

- (1) Half a day per week be devoted to an abridged version of the Institute of Industrial Administration Certificate Course in Foremanship and Works Supervision. Lectures to be held in a local centre or as extension lectures in the factory where the size of group merits such a Course. These could extend over a period of two years.
- (2) Weekly or fortnightly lectures be organised by a Staff Association, local centre or professional institution. The supervisors should be encouraged to enter into the discussions arising out of the lectures.

Note.—In either (1) or (2) an important part of the work should be the development of self-expression in English, both written and spoken. Courses arranged to suit local needs.

- (3) Subsequent methods of keeping abreast of new developments will be mainly through refresher Courses provided in the area.
- (b) *The Education of the Prospective Supervisor.*—A group of young personnel, who have already completed a commercial or technical course, should be selected at about 21 or 22 years of age, and given a course of specialised training.
- (1) Half a day per week to be devoted to the Institute of Industrial Administration Certificate Course in Foremanship and Works Supervision. Lectures preferably held in a local centre and spread over two years.
 - (2) Periods of about three months to be spent in the various departments of the business or factory, depending upon the nature of the firm or area. During training lectures would be given to the group by staff executives explaining the work done in each department. Visits would

- be arranged to other works in the area on a reciprocal basis through the local centre which acts as a clearing house for all such arrangements.
- (3) Trainees who show the necessary promise would be encouraged to continue study in the Intermediate Certificate Course of the Institute of Industrial Administration, and subsequently for the Higher Certificate. This again should be in the form of part-time study during working hours.
 - (4) Attend refresher Courses in Management subjects.

(B) *Executive Groups*

- (a) At 19 years of age, following Senior Courses in Commerce or Technology, those showing promise would be placed in the trainee grade of executives in the functions of labour management, office management, purchasing, sales management and works management, and would begin the Courses of Training adopted by their representative functional bodies. It is suggested that :
 - (1) Two half-days per week be devoted throughout two years to the Intermediate examination. Such Courses would probably need to be provided in a regional centre.
 - (2) One half-day per week be devoted throughout two years to the Final examinations under condition (1).
 - (3) During the final Course lectures would be provided on the business premises wherever possible. If this is not convenient, then the trainee should be placed as an understudy to the executive concerned ; or someone in the business would act as his mentor or director of studies and co-operate with the local College in the development of his training.
 - (4) Throughout the final period the trainee would attend any special lecture Courses provided within the area.
- (b)
 - (1) Where technical Courses are involved in the training for Work's Staff on the operational side, the trainee would first of all take the Higher Certificate stage of the relevant Course, e.g. Mechanical, Production or Electrical or Chemical Engineering, etc. Quite a number of part-time Courses are already in operation with at least two half-days' release from the factory.
 - (2) The technical Courses already provide for endorsement in certain introductory subjects coming within the province of management education. A natural development would be the Institute of Industrial Administration examination scheme at the Intermediate and Higher stages, again by part-time study over two years.
 - (3) As the trainee takes up responsibility he will be kept in touch with development by the means of the refresher Courses provided in the area.

(C) *Higher Executive Groups*

- (a) Education and training now take on a new meaning, since the product of our new system has arrived at a position of real responsibility. He will need to be kept in touch with the latest researches and techniques within the field of management, and this will be done through the medium of refresher Courses, or through special lectures at regular intervals which are organised in the area. Executives who are already established will also be able to follow the same Course. The Institute of Industrial Administration has a definite responsibility here, because it should give a lead with regard to the provision of eminent lecturers to deal with their own specialised subjects. This group within a region could provide itself with regular lectures of definite application to its own particular area. It could provide its own material for case method, and arrange for interchange of ideas. Meetings would be held at convenient places to suit the immediate problem, and not necessarily in the local centre.
 - (1) Meetings to be arranged at regular intervals (fortnightly or monthly) at suitable times during the day. A local representative Committee would deal with all arrangements. Case method could be employed here.

- (2) Special intensive Courses where these are of benefit to the district. ~~Week end conferences~~ might be used with advantage in this connection.
 - (3) Executives themselves would be encouraged to undertake some of the lectures and lead subsequent discussions.
 - (4) Selected executives to be sent to the Staff College for specialised training.
- (b) An alternative scheme for the executive who is already established and required to maintain touch with the latest developments might be as follows :—
- (1) At each meeting of the Local Manufacturers' Association or Chamber of Commerce a short discussion on a topic introduced by a visiting speaker would be part of the usual procedure.
 - (2) Monthly luncheon meetings in the area where special subjects would be discussed under suitable guidance.
 - (3) Case method organised on special lines to suit area.
 - (4) Special short Courses of three or four meetings at regular intervals organised by a local centre, and held in the local College or in the factory or business house. In the latter case the opportunity would be available to make a tour of the organisation and consider special techniques in actual operation.

UNIVERSITY TRAINING

In my opinion there should be a break of at least one year between the school and University. This time would be spent in Commerce or Industry under specified conditions, a procedure which should go a long way towards meeting many criticisms made against the graduate going down from the University. Towards the end of his Course the graduate would take a special series of lectures to cover the administrative field in a general way. Upon taking up employment, he would come within the scope of Courses for the education of Executive Groups.

The idea is put forward that training in Management should not form part of a normal full-time University Course, and such a Course should not be considered as giving the graduate a prior claim to posts of responsibility. He will still require* training in this connection, although he might be expected to make good use of such training by virtue of his University Course. For work in connection with certain specialised functions which exist in most organisations, a short period of training only may be necessary; and in such cases he has an advantage over other types of trainee.

Under the new system the Universities should provide a wide variety of part-time Courses at the post-graduate and adult levels of development. Special departments of the University could from part of the Staff College with great benefit to the Community.

STAFF COLLEGES †

Throughout the country a series of Colleges should be set up in all important centres under the direction of a Central Staff College, where special sandwich Courses would be available to all those recommended to them. This again might take the form of a two

* See p. 197.

† "... a scheme has been devised and launched to establish an Administrative Staff College, to bring together men and women of executive responsibility from industry and commerce, the trade unions and central and local government to study the common principles that underlie effective administration."—Sir Hector J. W. Hetherington, LL.D., in *The Times*, 7th November, 1945.

years' Course, but in this instance probably three-monthly periods in the College interlinked with three-monthly periods in the works would be most satisfactory. These Colleges would be mainly residential; but they would also be available for short conferences in Management work, and also for refresher Courses at various levels of training. A further use of these Colleges would be the training of teachers for Management subjects, and the conduct of research in all its branches concerned in this field.

CENTRAL AND REGIONAL CO-OPERATION

It is not generally realised that there does already exist a great deal of co-operation between technical education and organisations representing trades, industries and professions. It has never been developed on the commercial side to the same degree. Machinery is already in existence which could deal with the regional development of education and training in management. With regard to development on a national basis, several professional institutions operate schemes jointly with the Board of Education, and these are sufficiently well known without further reference here. These schemes have been so successful in operation that they justify adoption in the solution of our problem. The detailed schemes indicated now should be embodied in National Certificate and Diploma schemes in Industrial Administration and Management. It may be that the consultant body should be the British Management Council with some Professional Body acting jointly with the Board of Education. Actually it would mean that a special Committee elected by the Council would be responsible for the layout of the various schemes, and would control the detailed operation and assessment of the internal examinations held throughout the country through the medium of the Professional Body. In this connection the Institute of Industrial Administration could contribute a great deal, since it has controlled and conducted examinations over a number of years, and its experience would be available at once to initiate the schemes. No attempt is made to lay down individual subjects of study, but a great amount of work is involved in the rationalisation of the syllabus content of the many subjects involved in the Courses. The great feature of the National Certificate type of course is that it can be varied to suit the needs of a particular industry or area, and although many common subjects are provided, the special subjects required to suit professional requirements can be incorporated at each stage of the respective courses. Professional standards are maintained through the various moderating Committees, and through Assessors who are appointed to deal with the examination papers and check the marked scripts of examinees. Although the subjects may vary in different regions, this procedure ensures that the level of attainment in connection with the predetermined standards which have been laid down by the various Joint Committees, including representatives of the Board of Education, will be maintained in practice. It is suggested that the rationalisation mentioned above should be undertaken by the

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Institute of Industrial Administration acting as central authority for the Council.

NATIONAL CERTIFICATES AND DIPLOMAS IN MANAGEMENT

To avoid confusion the present schemes would be known as Senior and Advanced National Certificates in Commerce or Technology. The new scheme would embody :

- (a) Ordinary National Certificate in Foremanship and Supervision.
- (b) Intermediate National Certificate in Administration and Management.
- (c) Higher National Certificate in Administration and Management.

IN GENERAL

A Course should extend over a minimum of two years' part-time study in recognised centres and institutions.

Course (a) is sufficiently defined to be self-explanatory. Section (b) would embrace Courses of three or four years' duration, with a terminal standard equivalent to that of the present Institute of Industrial Administration Intermediate Certificate examinations Syllabus. This would mean that the normal age of completion of this Section would be approximately 25. Apart from refresher Courses, this would be the limit of study in many cases, especially for junior executives.

Section (c) would embrace all the two-year Courses for Senior executives, and would ultimately be regarded as the minimum standard for practice at this level.

The definite break between (b) and (c) enables all contributory Courses to feed into the scheme, whether these have been part-time or full-time. In any case, there should be no difficulty here, because the Staff Colleges, Universities and Regional Technical Colleges providing full-time Courses, or special sandwich Courses, will have their own approved schemes of training subject to the same conditions governing the award of Certificates and Diplomas.

The merit of this scheme lies in the provision of maximum flexibility, together with a directed and objective training at all levels. The present certificate schemes in Commerce and Technology will continue to provide basic education in functions other than those understood as administrative in practice. The new Intermediate Certificate would deal with departmental or functional knowledge in Management subjects. The new Higher Certificate would envisage the introduction to the analytical phase in training for Management and the extension of this analysis to the principles of Management practice. At this highest stage the suggested code governing such practice could be incorporated.

Throughout the courses such factors as personality and character will require special consideration, but the scheme allows scope and freedom for development on these lines. Finally, the great advantage claimed is that experience in Administration and Management is obtained concurrently with education and training in its broadest sense. Such education and training is obtained at minimum cost

and with least dislocation of service to commerce and industry owing to the part-time basis of the scheme. Continuity is also important.

PANELS OF LECTURERS

It will be necessary to train suitable lecturers, but it is envisaged that established executives will undertake most of this work. If we are to give the fullest meaning to management as a social service, then this can be a real contribution. Quite a lot has been said about the pay of lecturers, but this has generally been on the scale paid for degree subjects. Up to the present the poor attempt to provide management training may not have merited any better reward. And why should the cost be borne solely by an educational authority?

OPERATION

It is laid down as a general principle that all training of this nature is the responsibility of commercial and industrial firms, and should be provided in normal working hours. Incidentally, also, the cost should be borne by them. Since all recognised educational schemes are entitled to a 50 per cent. grant from State funds, it is not an onerous burden. In any case, systemised education and training for the important function of administration will be cheap at almost any price.

Here is the scheme for the future development of executive control. As one eminent industrialist recently stated: "The domination of money—the power of finance, the whole conception of our business and industrial fabric as we know it now—may have to be seriously changed before our clearer specification can be written, our new blue-print drawn." He was pointing out that industrialists had not yet given the educationist a specification of the men wanted and for what purpose.

Why should we not face up to such a radical change? Here is an opportunity for the Institute of Industrial Administration to provide the lead, and show itself as a vitalising force in the reconstruction of the new social order.

Table I. Scheme of Development of Education and Training in Management.

Table II. Diagrammatic Representation of Scheme.

NOTES ON TABLE II

Brief reference has been made to selection, and then training for the selected purpose. This country has not yet faced up to the problem, and present investigations have been left to individuals.

With regard to training for administrative work, the suitability in relation to the population under review would follow the normal curve known as the Gaussian law. The percentage spread on a 5-point scale would be of the order of 5, 22, 46, 22 and 5 in descending order of suitability. Thus it is anticipated that 5 per cent. would

TABLE I
DEVELOPMENT OF EDUCATION AND TRAINING IN MANAGEMENT

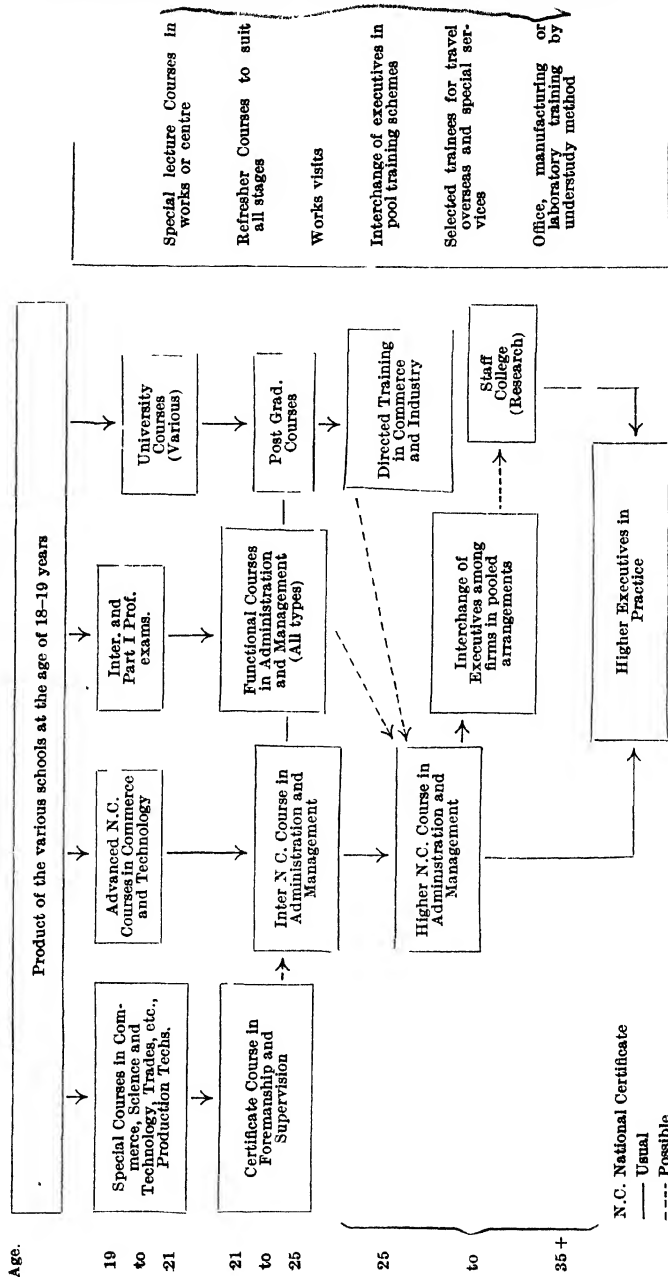


Fig. 13.

TABLE II

EDUCATION AND TRAINING IN MANAGEMENT

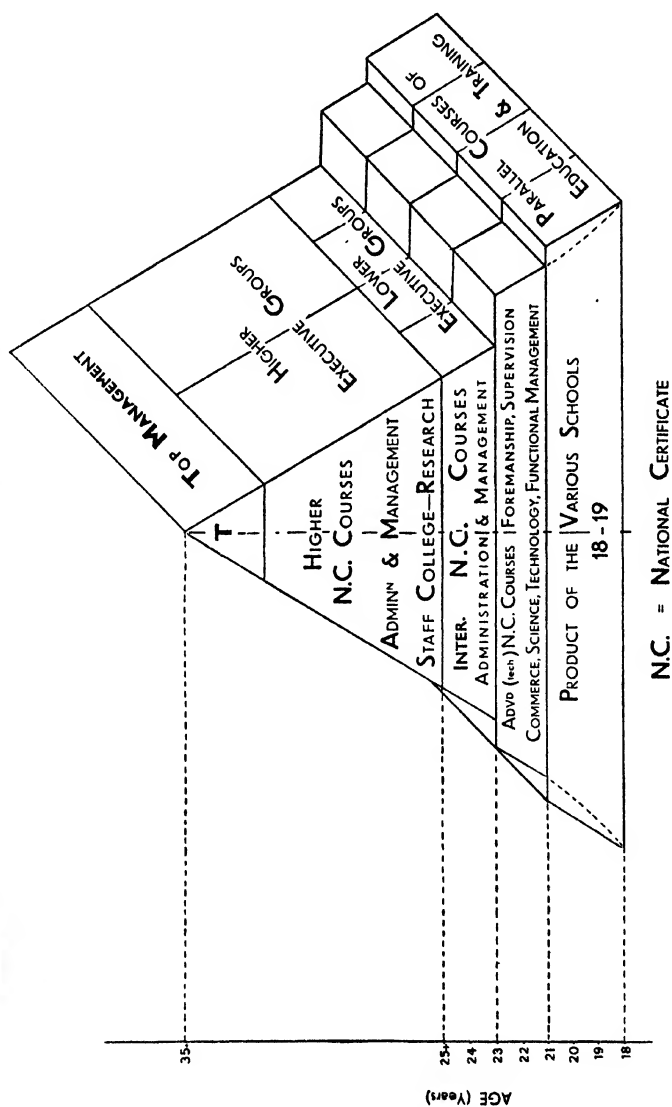


Fig. 14.

reach the section indicated by the triangular section T at the top of the diagram. 22 per cent. would fall within the second but important group, which might be termed the Main Managerial Group. 68 per cent. would reach an intermediate stage depending on functional duties. The remainder would be unsatisfactory, but it should be remembered in this connection that a large number will have been regarded as unsuitable before reaching the base section at the age of 18-19 years.

It is clear, therefore, that present training facilities used to capacity, together with the suggested changes, will be sufficient for the purpose. It must be stressed, however, that sectional industries should set up their own specialised departments to deal with this vital problem of selection of personnel for specific duties in functional management and administration even at the high levels. Alternatively it could be one function of the Staff College.

Replying to the discussion, MR. BROADBENT said: MR. BURNHAM mentioned the position of foremen of some years' standing, but I do not think the problem is insuperable because, there again, it depends upon the way in which it is tackled. You can get a great deal of help from the "old sweat" in industry. We all know those people who say it is not important for them to get further education after leaving school, and we have just got to face up to the fact that a large percentage of such people will always be with us. It is useless for industrialists to assert that education sets the pace. They obviously are the masters of the situation, and it is for them to determine exactly, or very nearly, what they want from the educational system; and when they have decided that, the necessary training will be done. If the new social order is going to mean anything at all, industry will have to take a great deal of the responsibility for the new training, and even busy executives could surely afford a couple of hours to talk to young trainees. Incidentally, it would do themselves a great deal of good.

The question of training personnel for the smaller firms—and over 90 per cent. of the industry in this country normally is carried on by the small firms—is obviously important. It can be met by pooling facilities in any area. The young trainee need not be attached to one particular firm. In this we have a national obligation in training for a new social order, therefore we have got to give the trainee the broad experience of every type of firm, and every chance to travel around and see what is actually happening. All information accumulated should be for the benefit of everybody and the local college could be used as a special centre under the control of the local committee which could disseminate the information. I agree that social history should be included in every course.

MR. T. G. ROSE contributed as an addendum to the paper: The following Notes arise from the experience gained at the Refresher Courses in Planned Management organised by the Sheffield Centre of the I.I.A., with the collaboration of Sheffield University.

It would appear that the main purpose of Refresher Courses is to arouse the interest of those attending in the problems which arise

in an industrial undertaking as a going concern, and to break down the tendency of individuals holding executive positions to interest themselves solely in their own functional work. Such courses cannot, and are not intended to, take the place of the thorough education in management principles which is necessary to qualify an individual for a position of responsibility in industry.

The schedule submitted with these Notes is built up from the point of view of position held, irrespective of age, since the responsibilities carried by different executive positions remain broadly the same whether in a large or small undertaking. The idea at the back of a Refresher Course should be to set out the balanced working of the different management functions at the various stages of management responsibility. Courses should be strictly confined to those functional inter-relations, and should not endeavour to cover the full field of any individual function.

Obviously, those attending will hold executive positions in industry of one kind or another, since the Refresher Courses are not intended for students. It is impossible, therefore, to avoid each entrant having to sit through the lecture or lectures dealing with his own function, and in this the instruction given will probably be less advanced than the work he himself is doing. The lectures should be based upon setting out the matters relating to each function which should be known to the individuals in the grade for which the course is being held, *i.e.* a works manager taking an "F" course would have much more advanced knowledge of the management of his own function than will be put before him by the lecturer in the two lectures on production; he will, however, be instructed in what he ought to know about the remaining six functions, and at the same time enlightened as to what the other managers ought to know about production.

Before a course is started, a complete syllabus should be made up and a series of brief lecture notes worked out for each lecture in order that as far as possible functional aspects can be taken at the same level. If it is proposed to have a number of different lecturers speaking on the various functions, it is particularly important that they should adhere strictly to the limits of the lecture notes sent to them beforehand, otherwise there is a considerable danger that the lecturer will try to cover too much ground, or deal with the wrong aspect of the function.

There is no reason why the lecturer should not elaborate on the syllabus lecture notes, as long as he keeps within the field laid down. It is as well to distribute final drafts of these lecture notes before each lecture, in order that the entrant can retain them.

At the start of a Refresher Course there should be provided a list of suitable books which entrants can read if they wish to as the Course proceeds.

The writer desires to make clear that the diagram and these Notes merely represent a personal contribution towards the solution of the problems of organising practical Refresher Courses to assist those already occupied in industry.

SUGGESTED FIELD FOR REFRESHER COURSES IN INDUSTRIAL MANAGEMENT
TWELVE LECTURES OF 1-1½ HOURS EACH

Course.	Intended for—	Syllabus.	Lectures Allocated to the Seven Primary Functions of Management thus—						
			I Pro- duction.	II Distribu- tion.	III Develop- ment.	IV Accounts and Finance (and Costs).	V Legal and Secretarial (and Office).	VI Personnel and Industrial Relations.	VII General Manage- ment.
A	Operatives (Manual)	Elements of management as affecting the manual operative in direct or indirect production	3	1	1	2	1	2	2
B	Operatives (Clerical)	Elements of management as affecting the clerical operative in works or office procedure	1	1	1	2	3	2	2
C	Foremen and Superintendents	Fundamentals of management as affecting direct and indirect works production organisation	3	1	1	2	1	2	2
D	Assistant Managers	As "C," but more advanced, including elements of general management and control	2	2	1	2	1	1	3
E	Salesmen	As "D," but with special reference to what sales staff should know of the links between distribution and the other functions	1	3	2	2	1	1	2
F	Departmental Managers	As "D," but more advanced in all func- tions	2	2	1	2	1	1	3
G	General Managers and Managing Directors	Specially selected matters relating to the organisation, stimulation, and control of all functions, and the presentation of control information in its most useful form	1	1	1	3	1	1	4

Fig. 15.

AMERICAN DEVELOPMENTS IN EDUCATION FOR INDUSTRIAL MANAGEMENT

By DR. JAMES A. BOWIE, M.A.

(Fellow. Principal, Dundee School of Economics)

Bismarck is reported to have remarked that the most important fact in the world was that Britain and the United States spoke the same language. Whether or not you agree, you will at least agree that this does not necessarily mean that they speak in the same idiom. In 1931 I went to America to join the staff of the University of Pennsylvania and thereafter went on an extensive tour around the business schools in the United States. What surprised me was the enormous development that had taken place there. Going out in the boat I remember I could not help thinking we have contrived to misrepresent each other. In the school to which I went there were 90 professors of business and 87 lecturers and assistants. Altogether a million young people in the United States are studying business, and, on a University level, some 100,000.

It seems to me such a pity that two democracies using the same language should speak so little to one another. I think it is even more necessary to-day that we understand what is happening over there. America has accepted whole-heartedly the idea of education for business, and there are now 400 University schools of business in the United States.

EXTENT OF THE MOVEMENT

We in this country know far too little about what is happening in the United States. Why is it that two democracies, using the same language, speak so little to one another? When I visited America to study schools of business, I felt like an educational Columbus.

The development of business education in the United States between the wars was rapid and dramatic. . . .

According to the U.S. Statistical Summary of Education, 1937-38, the number of first degrees granted in 1937-38 in professional schools of University standard was as follows: *Education*, 31,965; *Engineering* (all branches), 10,577; and *Commerce and Business*, 10,240. Thus Commerce and Business ranks as practically second equal among the University professional schools and is much larger than Law, double the size of Medicine, and two and a half times as large as Agriculture.

The spread of the movement in the United States has no doubt been facilitated by the fact that Americans have always envisaged their Universities as institutions which should participate in training for the practical affairs of life—this, of course, was the original attitude to Universities in this country until the emergence of a

leisured class to whom "culture" was purveyed. In view of the Americans' acceptance of the idea that the higher levels of practical education are quite properly a function of a University, it was only to be expected that business, overwhelmingly their largest practical activity, should have its training schools at the University level. Several large permanent endowments have been secured by leading Universities for this purpose, and it is a matter of common knowledge that this purpose appeals so strongly to legislators that not a few State Universities have been enabled to nourish other forms of social science work (notably economics) under the ægis of appropriations for business education.

That the study of technology developed before that of administration was an accident. Which of the two attained priority depended on which first attained to a specialised intellectual technique, at once the sign of maturity and the symbol of a profession.* The first basic sciences to be developed were mathematics, physics and chemistry, and so the period prior to about 1880 was one of emphasis upon the development of productive capacity conceived as a purely technical problem, and, therefore, one characterised by the establishment of schools of technology. During that period training for the non-technical aspects of business was largely confined to drill at junior schools in clerical, computing and manipulative techniques—the clerky arts.

In both America and Britain this matter of secondary commercial courses is one that the advanced schools of business have tended to ignore. So far, from an intellectual point of view, secondary school education for business has been wretchedly poor, being still in the grip of its inheritance from the private "business colleges," from which it has sprung. Usually their curricula are little more than clerk and typist mills, masquerading under the deceptive name of commercial courses. In the United States, however, a great change is taking place in the teaching of the social sciences at secondary school level; and the University schools of business are beginning to study this situation in its bearing upon the organisation of their own curricula.

Had the world developed the social sciences before the physical sciences, history would have written a different story, and (can we doubt?) a better one. If psychology, economics, sociology, had been developed early instead of the physical sciences, we might have built on them an art of neighbourliness and a technique of human relationship which is the core of all the science of administration, such that the wrong men do one another in war, unemployment, strife, poverty, disease and crime were as unthinkable as the witchcraft and sorcery of yesterday.

THE PROLIFERATION OF COURSES

In recent years there has been an increasing tendency to emphasise certain basic courses of study as being of outstanding

* See p. 392.

importance. The basic courses are conceived as consisting of not one, but two groups of fundamental studies. The first comprises those which develop a foundation for business education and a setting for industrial life; the second, a group of studies which comprehend the common core of business operations and processes.

The idea underlying this trend is that other and more appropriate agencies of commercial education, such as the business college and the evening school, serve the function of giving specialised, technical, "acquisitive" training to persons who know from experience what they want. The idea is growing that the function of a university school of business is not to compete with these other agencies in the production of managerial technicians, but to train students in the larger aspects and situations which lie behind and beyond the mere techniques of management. Thus there are signs in the academic sky that the day of specialisation is passing.

Put briefly, it is now recognised that the aim of a school of business is to prepare the student for the broad responsibilities, rather than the narrow routine of his new profession. Graduates of business schools, the lecturers, and business managers are all agreed that a wide background of general and economic knowledge, disciplined capacity for independent thinking, facility in oral and written expression, and instinctive appreciation of ethical values and responsibilities should constitute the primary aims of professional training for business. These ends, it is recognised, can best be attained in the field of the students' interest and motivation.

Reinforcing this movement away from specialised "practical" courses at the Universities is the realisation that the development of capacity for applying imagination and intelligence in attacking concrete problems is of importance, while perhaps of even greater moment is the possession of certain personal traits and attitudes which enable a man to work effectively with others in mutual enterprises. In so far as such traits can be cultivated, their development is believed to be among the responsibilities of the school. In the main it is felt that formal courses in psychology, personal relations, public speaking and salesmanship are not by themselves effective, and the effort has been rather to create such a University environment that the desirable skills and traits are encouraged as a by-product. It is interesting to note, by the way, that it appears, from data collected, that these desirable personal traits are to a great extent unrelated to superior intelligence or high scholarship.

THE CURRICULUM

Where a University dares to invite from its former students an expression of opinion as to the value of its courses, the results are apt to be disconcerting—if so stately an institution is capable of feeling disconcerted. American business graduates almost unanimously agreed that the study of English should be of primary importance in the business curriculum, while there was equal

unanimity in asserting that foreign languages were the least valuable subjects in the course of study. Further, there was also widespread criticism among graduates of the usual informational lectures, memorisation and regurgitation of factual material. On the contrary, they felt that primary emphasis should be placed upon training in analysis and expression through seminar and research work, field and laboratory investigations, the use of cases and problems, and other individualised methods of instruction involving the investigation and critical examination of material and the formal written and oral presentation of results.

The great difficulty in the United States has been that college curricula have been the products of factors other than a careful analysis and sober judgment of what business is, and what a university should tell the student about it. Once this matter is settled the problem arises as to how to identify the background studies. Just as mathematics and physics are fundamental to Engineering science, and chemistry and biology to Medicine, so there must be similar fundamentals to business. Some attempt has been made in recent years to identify them as a result of the inductive process of job analysis. While it would be wrong to suggest that finality had been reached, there seems a general consensus of opinion that the following are basic: Economic History, the English Language, Geography, Mathematics and Statistics, Political Science, Psychology, Sociology.

An interesting question that has led to much friendly debate in America is the one as to how far these outside subjects, which are an integral part of the Arts Course—that imperious dowager of academic life—should be modified and adapted to meet the needs of business students. This is not a problem peculiar to colleges of business, but is common to all specialised undergraduate schools. The usual attitude is for the Arts departments concerned to frown on the suggestion that modification is necessary. Their difficulty, and it is a real one, lies in the fact that adaptation means the appointment of new lecturers who have a knowledge not only of the subject concerned, but also of the field to which it is proposed to adapt it. Many of the lecturers have not this dual knowledge, and in any case, cannot see what professional future is offered to anyone who probes about in such vague intermediate fields. So their reaction is that adaptation is neither necessary, nor, indeed, desirable. Nevertheless, this problem of curricula is being increasingly settled by adaptation, for it is realised that if the lecturer cannot clarify the relationship between studies, the student is even less able or likely to do so.

Based on the background studies, which occupy generally the first year, are the common core of business subjects, which fill up the second year of the four-year, full-time University course. Such subjects include the following: Business law, statistics, marketing, accounting, money and banking, and business finance. The reasons which have led to the introduction of these general subjects are, first, that most students do not know what particular field of

business they wish to enter; second, investigation shows that even of those who do have definite fields in mind and who prepare for them, very few will remain permanently in that field; and, lastly, and most important, every business man, no matter what his special function may be, needs an understanding of business in its larger aspects, if he is to be really effective in his chosen field. It is the business of a University to produce industrial statesmen.

METHODS OF INSTRUCTION

The schools of business might have been expected to experiment with new methods in the educational field, seeing that personnel management is one of their special subjects. But, as things have turned out, these schools cannot claim to have made *unique* contributions to such matters as student selection, student adjustment, student participation, job placement, curriculum analysis, personality development, or any other aspect of educational policy.

It has always been a weakness in educational method that it considered too little the students' reactions, and made too little effort to encourage the student to participate actively in the learning process. The main difficulty has always lain in the necessity for putting large masses, at small cost, through the educational process. Nevertheless, some things have been attempted. It has, for instance, been common for business schools to encourage students to work in some industry during their vacations. So far as I know, no American school of business had, at any rate up to the last slump, taken a leaf out of the book of experience of the agricultural schools and established an experimental business to provide its students with clinical experience.

Greater student participation in the learning process is one important way of compelling recognition of different levels of student capacity and so securing greater attention to individual needs.

As it is, University training frequently fails to develop in any substantial degree the student's capacity for independent thinking and effective expression. For this the Lecture System is to blame, but it is not used without adequate excuses. The first is that it is an economical system, since it enables one man to reach as many students as the classroom and microphone permit; and the second is that it is the only possible method in all those newer fields of knowledge where no reliable text-books are available. Yet in spite of the extensive use of the lecture method, it finds few advocates among the students, and practically no lecturers uphold it as the ideal method. It is now generally realised that teaching is really effective only when classes are small and where attention is given to the varying needs of individuals. Certain it is that only in small groups is it possible to develop the student's personality, his facility for co-operative effort, and his capacity for effective expression by means of written or oral reports.

But the solution of this question depends on cash. So far we seem to have decided that whatever else education may be, it must

be cheap. When we decide otherwise, there may be some hope of making it the joyful process it should be.

Why is there this difference in the position in America and here? It is first due to the lavish beneficence of business men. Charles Baker gave six million dollars to Harvard's post-graduate school of administration, and thousands of similar gifts have been given, running into many millions of dollars. The second reason is that American ideas of a University are so different from ours. America considers a University should be useful. It takes a keen interest in the man in the street.

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CONCLUSION

Business education is not conducted solely for vocational ends. The world-wide economic depression revealed the necessity of providing at least elementary economic and general business information for all citizens in a democracy.

The main developments in American business education seem to be, a trend away from undue specialisation and a return to the more general subjects, decreasing emphasis upon detail and routine and technique, the beginnings of regional specialisation in management education, a trend towards fewer courses, insistence upon a better pedagogy, growing belief that in all matters of business and its teaching the analytical methods of the scientist will alone bear real fruit, increasing suspicion that departmental lines must be disregarded, and, finally, growing recognition of the importance of research.

Now that Education for business management is being advocated on all sides in this country, the lessons from American experience should be of great value.

TRAINING SUPERVISORY STAFFS FOR INDUSTRIAL MANAGEMENT

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We must be quite clear what is meant by "Supervisory Staff," what qualities are demanded from such staff, and what is its place in an organisation. I have assumed supervisory staff to relate to ALL grades of staff up to and including departmental heads or superintendents in charge of principal departments. Most of the literature on this subject relates to the engineering industry. This is understandable in view of the size and importance of this industry in our country. The problem, however, affects many other industries, and as I am not an engineer, my inclination is to think of industry other than engineering, for example, the heavy chemical

and metallurgical industries. Supervisory staff could, therefore, include production foremen, shop foremen, craft foremen, process and plant superintendents; also, supervisory staff in certain specialist functional departments, and in this connection I think it is well to include certain Works' office sections. This line of demarcation is not a hard and fast one. It will be clear from my remarks on technical qualifications and management training that the transition to higher grades of management follows naturally.

We must also consider the sources from which supervisory staff is recruited, for example, the elementary school, central school, junior technical school, junior commercial school, secondary and public schools, technical institutions and the universities. The higher grades are in many cases recruited directly from the universities: of necessity, however, many must be recruited from the other sources. It is very desirable that there should be an "open door" to promotion—the way should be left clear for advancement from the junior to the highest supervisory positions. There are, in fact, two grades of personnel moving upwards along alternative routes, each having distinct advantages. A better feeling will undoubtedly exist throughout a staff if it is clear that there is no bar to promotion.

What are the functions of a supervisor? It is said that a foreman or manager is born and not made, and the same remark could be applied to all supervisors. This is a part-truth. It is true certain individuals possess natural aptitudes for this type of function, but that would be quite insufficient without education and training, especially in the modern complex industrial world. It is equally true that very little can be made of a man without the proper aptitude, even with training and education. The answer lies in careful and correct selection.

THE FIRST REQUIREMENT

Views differ as to whether management training should be imposed on top of a technical specialist training, or whether it should be a separate training by itself. I feel that this argument can only be applied in the case of staff of a higher grade than supervisory staff. I am convinced that it is necessary for supervisory staff to possess technical knowledge relating to its particular work. The best craftsman or the most skilled operator does not always make the best supervisor: the reverse is often the case, but it is certain that the good supervisor must have adequate technical skill and experience, so that he knows when work is being properly done. He is right on the job, and is intimately concerned with keeping the wheels going round. Depending on the particular supervisory position held, he must possess experience and technical knowledge of a particular branch, for example, production, some particular craft, labour, chemistry, costing, etc.

Assuming then that he is technically qualified, there is another very important aspect of his duties, namely, management. The supervisory staff is an integral part of the management, and the job

of supervisor is very similar to that of the Works Manager or higher executive. He is concerned with a business within a business, and it is his job to manage it. The supervisor occupies a very important position in management; he is very close to the operatives—in fact, he is in constant touch with them. In larger works, the supervisory staff are the Management so far as the operatives are concerned, and it is from this staff that the workmen obtain their conception of the policy of their particular concern. These latter remarks are particularly true of foremen. Decisions are made in the Board Room, but frequently the form in which they actually reach the men depends on the supervisory staff. Character, leadership, co-ordination and co-operation are some of the principal requirements in such staff. The supervisor must know fully the requirements of his own section and also something of the general scheme of things so as to know where his co-operation with the other functions is most essential. He must not only have the leadership and ability to obtain results from his subordinates, but he must also have knowledge of many of the other functions of the factory. He must have the ability to deal with those above him, below him, and around him.

THE SECOND REQUIREMENT

This brings in the second requirement in the training of supervisory staff, namely, education in the structure of the organisation and in the principles of supervision.

This becomes most necessary where planning and progress are highly functionalised. Previously in small organisations, the supervisor was a man of all-round knowledge and handled most details personally. He was frequently the undisputed boss of his department and few dared interfere with him. With the complexity of modern industry he has been relieved of much of the detail by the creation of functional specialists who are available to all departments in the works and not only to a particular department. This arrangement should not in any way detract from the status of the supervisor. It alters the method of management of his job and greatly assists him in doing it. There are available those specialists with time to devote to one particular subject. It is the supervisor's duty fully to understand the functions of the specialists, and to make complete and adequate use of them. These specialists can go into much more detail than is otherwise possible. This method of so-called "Functional Supervision," as opposed to "Departmental Supervision," may tend to create some friction. There must, therefore, be a clear-cut statement of authority, and, of course, a large measure of co-operation is essential. This word "co-operation" occurs throughout literature in management, and it is the basis of any smooth-running organisation.

Obviously, education is necessary to enable staff to understand this type of management. Every supervisor must have an appreciation beyond his own immediate problem, so that there will be a proper contribution from each part of the organisation.

Summarising, therefore, at this stage, there seem to be two elements in the education and training of supervisory staff, namely :

- (1) Suitable education, training, and experience in a particular profession or craft.
- (2) Education and training in the elements of industrial administration so far as it applies to this grade of staff.

The second consideration calls for the more extensive treatment in this paper.

(1) SUITABLE EDUCATION, TRAINING AND EXPERIENCE, IN A PARTICULAR PROFESSION OR CRAFT

In the case of supervisory staff, I feel some reference must be made to the first, however briefly. Therefore, I propose to select a number of examples, as follows :

(a) *Apprentices and Analogous Grades, for example, Junior Laboratory Staff and Junior Office Staff.*

This paper deals with the lower grades of management staff, and such staff is the foundation of good management. A large number of supervisory staff will be recruited from apprentices, etc., and the type of staff coming forward will be determined by their training and education.

Boys will come from many sources—from the elementary school to the secondary and public schools. Some firms insist on matriculation or school certificate, but that cannot be discussed here. Many boys will not have reached that stage and their education is a big problem. Most of it will be by evening classes after the day's work, but part-time *day* study is more desirable. It is expected that there will be legislation on this point dealing with the school-leaving age and also making day continuation schools compulsory. Industry carries a big responsibility in the matter and must play its full part. It must be realised that industry is made for man, and not man for industry.

A common policy must be pursued in the training of all these grades of staff. Everything must be done to ensure that they have a complete practical training in their respective spheres, and all help and encouragement must be given them to take advantage of available educational facilities. They should be encouraged to proceed to qualifications, and the brighter boys will take the highest qualifications—such qualifications as the National Certificates, membership of the professional institutions, and degrees. A scheme of training can include special selection of boys for special training at a technical institution or university.

Many large firms have schemes of reimbursement in connection with such training. One method which is adopted by many, in the case of junior staff, is to reimburse class fees, travelling expenses, and the cost of certain books, instruments, etc., provided there is satisfactory attendance and examination results. As regards time taken off from work for part-time day classes, usually no deduction is made for the time taken off—as a rule, one day or two half-days per week.

(b) *Foremen.*

This grade of staff can include craft foremen in engineering and other works, engineering production foremen, and production foremen in industries other than engineering.

Craft foremen and engineering production foremen would mostly be recruited from the ranks of those who had served an apprenticeship. Engineering production might entail additional knowledge other than knowledge of a craft : such men are more concerned with production and planning and require the knowledge and ability to fit them for that work. The scope of the

engineering foreman is limited only by his aptitude and educational ability to advance himself in position. No reason exists why such a man should not fit himself, both by reason of experience and education, to take a place in the higher ranks. There will be general limitations to this: for example, such men may become Works Engineers, but only exceptionally Chief Engineers.

In the case of production foremen in other industries, for example, chemical and metallurgical, such foremen have in the past been recruited from the ranks of the process workers according to their knowledge of the process and their general personal characteristics. The demand is all the time for better education in all ranks, and, as mentioned elsewhere, such foremen could also be recruited via the chemical laboratory; there is no reason why they should not proceed to the higher grades of supervisory staff, such as assistant superintendent and superintendent, if they qualify themselves suitably.

(c) *Departmental Superintendent in a Chemical or Metallurgical Works.*

Such positions may be filled in two ways:

(i) By appointing a graduate with suitable technical qualifications—such as a degree in chemistry, metallurgy, or chemical engineering—or from the Works engineering staff, provided the person selected has sufficient knowledge of the processes. It must be found whether the man appointed has an aptitude for controlling large-scale modern plants and for management. There are many methods of giving a man this training and also of studying his aptitude and ability. Ultimately, he may be attached to a particular department, and will rise by stages to assistant superintendent and superintendent.

In considering this problem, I feel that an engineer's training in many ways fits a man better for management and responsibility than the purely chemical or metallurgical training. Also, the engineer who aspires to membership of the professional institutions must possess a knowledge of the elements of industrial administration. I am not aware that this is the case with chemical or metallurgical training. I feel that more attention must be given to the training of chemists for industrial work and for management.

(ii) The second method is by promotion from the lower grades, most probably via the chemical laboratories. All entrants to the laboratories would receive a systematic training, both theoretical and practical. By careful selection it would be found that some were never likely to advance beyond the routine stage; others, with aptitude, would go into the processes and qualify by experience for promotion as production foremen. The most promising could be attached to the Research Department to gain experience in existing processes and in processes under development. Certain of this class could take junior operating positions on the processes as part of their training. Ultimately, a selected number of staff would be developed who would merit opportunities for advanced and specialised training—if necessary at a university or technical college. Also, the type of staff could be produced qualified to hold the position of superintendent of a department and one who could by application proceed beyond that stage. This method, in fact, would produce a graduate who possessed a very sound practical training and had been in intimate contact with labour. The selection involved would ensure a good type being produced for this grade of staff. The scheme would embody the idea of an apprenticeship to an industry combined with the necessary higher specialised education.

(d) *Employment and Welfare Officers.*

Both these functions are part of labour management and can be performed separately or by the same person, depending on the size of the Works. This work requires general knowledge of:

- (i) Law relating to contract of service, etc.
- (ii) Wage rate structures, especially in his own industry. This requires elementary knowledge of economics and social science.

- (iii) Miscellaneous Government regulations, for example, the Essential Work Order.
- (iv) Legislation such as Workmen's Compensation and Truck Acts.
- (v) Preparation and execution of general welfare schemes.
- (vi) Solution of personal difficulties of individual workpeople.

A Course of First-Aid is useful on the welfare side in giving a sympathetic approach.

The necessary knowledge can largely be obtained through the various Courses at Social Science Schools and those held by the Ministry of Labour. It is not beyond private study. Periodicals, such as the *Journal of the Industrial Welfare Society*, are useful.

It is a great benefit in both cases for the officer to obtain definite factory experience.

A college education, supplemented by the training of the Institute of Labour Management, is very suitable for both officers, and promotion is difficult without this wider training. Such a complete training is not available for everyone, nor is it absolutely necessary for these two positions. Such officers, however, will be seriously handicapped without a general education beyond School Certificate standard, followed by a few years, first in the Works and then in the labour office.

Undoubtedly, the best training for this staff is the training for a Labour Manager; they should be Labour Managers in embryo.

(e) *Clerical Supervisor.*

All functions of factory management require clerical work, compiling the records on which such management is based. In the larger firms clerical work is sectionalised by functions, such as, personnel management, financial, engineering, etc., and such clerical labour must be supervised by executives qualified not only in clerical supervision as such, but also in the function within which they are working. In addition to their practical training in office routine, they should have passed at least the intermediate examination of the appropriate professional institution.

It is desirable that clerical supervisors should have a reasonable knowledge of factory operations, and some time spent in the various factory departments is useful.

(f) *Senior Cost Clerk.*

He is in charge of the department or section responsible for the allocation and presentation of all information relating to the proper control of expenditure.

The work of the costs department is usually sectionalised, for example, wages, consumption and stocks of material, cost of repairs, overhead charges, etc. Supervisors in these sections should have passed at least the intermediate examination of the Institute of Cost and Works Accountants.

The training of a senior cost clerk should include a large amount of time spent in acquiring a thorough knowledge of Works operations. This knowledge will be of considerable benefit to the work and will enable the supervisor to maintain a balanced view between accounting and the Works requirements.

(2) EDUCATION AND TRAINING IN THE ELEMENTS OF INDUSTRIAL ADMINISTRATION SO FAR AS IT APPLIES TO SUPERVISORY GRADE OF STAFF

This section covers the internal training of supervisory staff as distinct from external training, but, of course, it is not possible completely to separate the one from the other. One position is largely influenced by the other, and some reference must be made to certain external instruction which is available. Further, in this

grade of staff there exist different educational levels, and, therefore, the training cannot be stereotyped and will not be the same in all cases. Much has been written on this subject of internal training, but it is obvious that on the whole much remains to be done regarding its application.

The usual system of training executives is a very haphazard one, and consists in allowing one man to pick up his job by understudying his superior, who frequently has not the time and also very often is not inclined to impart his knowledge. Further, in this way the knowledge passed on is apt to be restricted.

In modern industry it is essential that staff should have a varying knowledge of the principles behind management, so that they can appreciate the policy of the Company and pull their weight in the organisation. Without such a training, the modern methods of industrial management are difficult to follow and inefficiency and dissatisfaction can result. I have seen this happen myself. As the organisation of a particular company became more functionalised, it was obvious that the staff as a whole did not appreciate the ideas behind the changes. Certain friction resulted, and it was only by co-operation, combined with some educative training, that the position was brought back to normal. I feel that senior executives very often overlook the fact that changes in organisation should be clearly explained to staff if good working is to result from the organisation.

With reference to education and training, there are certain Courses of instruction available on this matter. I feel in this particular case that the most valuable or the most suitable for a beginning is the Course laid down by our Institute for its two years' Course in Foremanship. This is an excellent Course, and is suitable for most of the supervisory grades of staff. It also gives exemption from certain subjects in the Institute's higher examinations, and so the more ambitious staff can proceed to the higher studies and take the Institute's full qualifications in industrial administration.

The great advantage of internal lectures is that they provide the possibility of covering the problems peculiar to any particular industry and of quoting familiar examples in discussion. Discussion, of course, forms a very valuable and essential feature of this type of training. The internal Course makes a very direct appeal to the staff. There is the danger, however, that the internal lecturer may be too narrow or too domestic, and this gives rise to occasional embarrassing criticism or provocation. This can be handled by lecturers of the proper type. There is no doubt that in most cases it is more convenient for the staff to attend such lectures internally, rather than in a technical institution at some distance from their work or homes. Further, such a Course is evidence of a Company's real interest in such matters, which is of considerable help in fostering the ideas, because, as many of you are no doubt aware, there is always much inertia to overcome in all new ventures.

INSTRUCTION IN THE COMPANY'S OWN PROCEDURE AND PROBLEMS

Such Courses are only one part of training and must be combined with instruction in the Company's own procedure and problems. The literature deals extensively with this type of training. One means is by conferences and discussions. This procedure is apparently much used and recommended, particularly in the case of foremen, who form a large part of most supervisory staffs, and who in many ways present a distinct problem. Different methods are adopted, depending on whether the foreman is :

- (a) Of the older type who has been in his job for some time.
- (b) Whether he is a younger type.
- (c) Whether he is a still younger type of higher educational status who is being brought on.

The first type is the most difficult. Such a man in all probability finished his school education at an early age and has not done much in the way of study for a very long time. Again, such a man does not relish the idea of "going back to school," as he calls it, or of being lectured. He has a very strong independence, which is a desirable characteristic, *but has its limitations.*

Experience has shown that the best way is to have meetings which should be informal. These can be attended by the management or specialist members of the staff, and informal discussions take place in a general way on all the aspects of the Company's organisation. Thus, valuable training can be accomplished and the foremen and everyone else greatly helped as a result.

Others recommend that the best results are obtained by the foremen meeting amongst themselves and discussing common problems. Again, another suggestion is the formation of a Foremen's Association which can organise, amongst other things, the educational side of the foremen's activities. The suggestion has also been made that there might be a National Foremen's Association organised on the lines of the professional associations and having active branches. In the United States of America there is a National Foremen's Institute.

Regarding the other two types of foremen, the more formal lecture and discussion Course is suitable, and this can be intensive in the case of the third class. In these Courses and discussions in the more advanced classes, the Case method and the Conference method can be used with advantage.

The demand for foremanship Courses proves that a large number of such staff are quite capable of profiting by this instruction, and lecturers at such Courses have commented on the keenness and intelligence of those attending. The foreman has received particular mention here, but everything that has been said would apply to all supervisory staff. The necessity of knowledge in supervision applies to all staff.

This method of training could be done on a wider scale and, in a scheme which I know is under consideration, it would consist of a series of meetings which all supervisory staff could attend. Such

meetings would have an atmosphere of informality. Members of the staff would give lectures on the various manufacturing processes carried on in the Works, explaining the principles behind them and showing clearly the interdependence of one on another. These lectures, of course, must be neither too simple nor too highly scientific to achieve their purpose. Ample opportunity would be given for discussion so that staff could ask sufficient questions to elucidate the problems arising. Other staff could speak on specialist subjects, such as, labour management (including labour arrangements with Trade Unions); wage payment structure and bonus schemes; costing; transport problems, etc. Such a training would give staff a clear picture of the Company's organisation as a whole and do much to clear away the feeling that one only works in a small corner of the Works and has no connection with the place as a whole. There is a genuine demand for this kind of thing, and it assists management all round.

Another valuable form of training is the so-called system of "Varied Experience." This means, in effect, that there should be regular interchange of staff between departments in the same Works, between Works in the same Group, and between Works of different firms. Much value can arise from visits to other plants, especially well-run ones. This system of "Varied Experience" can only be carried out, of course, to an extent depending on circumstances: it must have a broadening effect on the bulk of staff and is very educative.

JOINT CONSULTATION IN INDUSTRY

I am of the opinion that the impetus given to joint consultation in industry must prove a great help in industrial management training. The whole idea behind this is to integrate the knowledge of the workmen and the staff in assisting management. They become a part of the management function, and it follows that if the idea works at all those taking part in it must become much more widely trained and educated in the management and perhaps obtain a desire for further knowledge.

The Joint Production Advisory Committees are somewhat restricted in their terms of reference, and I am more interested in the Works Council idea, especially the Works Council with a modern constitution which enables it to deal with all matters, including all aspects of production, the only items excluded being those matters which are the subject of operative agreements with the Trade Unions. If properly constituted, such a Council will contain a large percentage of supervisory staff. On one such Council of which I know, there are fourteen Management representatives, and these include eleven supervisory staff made up as follows:

- 3 Superintendents.
- 1 Assistant Superintendent.
- 5 Foremen.
- 1 Laboratory Staff.
- 1 Office Staff.

Obviously, in a Works Council dealing with the variety of matters which Works Councils handle, this large number of supervisory staff will be brought closely into touch with the Company's management problems. Further, I can quite conceive that such a Council is competent to take a real interest in this subject of training and education in a wide sense. Many of our leading men are of the opinion that there are immense possibilities in joint consultative machinery properly used.

READING

A Works' Magazine or a Company's Magazine, or the like, can also be a real factor in this problem. By this means all staff are kept closely in touch with the happenings in the Company. Educational articles on all branches of the Company's activities can be included, and, of course, the personal part of such Magazines is always most interesting and appreciated, giving news of individual members of the Company's staff and workpeople.

Library provision in any Works is essential and valuable. Such library facilities as are provided should not be for the use of any one particular section of the staff. It is very necessary, of course, to have a first-class reference library for the specialist departments, but it should be remembered that supervisory staff, even in the lower grades, should have an interest in the library and would profit greatly by reading books relating to management and their work, and also trade and technical journals. The library is not always convenient to everyone, and where this is the case, consideration should be given to the circulation of journals on a wider scale than is sometimes the case, so that the information is widely distributed. In fact, certain publications might be regularly sent to a series of small departmental libraries. Every Works library, from our point of view, should obviously have a full management section. As a matter of interest, I might mention that we issued to each of our Works Departments a copy of *Dynamic Administration*, by Mary Parker Follett, and the Institute of Industrial Administration's book on *Introduction to Foremanship*.

CONFERENCES

Conferences on particular aspects of Works operations can also play a leading part in training supervisory staff. In one Works the responsible Director holds regular Cost Conferences to discuss and examine the costs of production. Naturally, at such Conferences many points relating to operation and management are bound to be discussed. Among other staff, the superintendents attend these Conferences and also assistant superintendents. They are given the fullest opportunity of commenting on all aspects of the costs and relevant matters.

In another instance the Production Manager holds a special monthly meeting with all plant superintendents to discuss operation

generally in connection with his own monthly report. A similar monthly meeting is also held with the superintendent of each individual department: in the case of the larger departments, the chief foreman is also present.

There are many differences of opinion on the operation of conferences and committees, and many oppose the idea. I feel personally that they serve a most useful purpose, and they provide a means of dealing regularly with matters which otherwise would only be dealt with at irregular times and under pressure of circumstances. By means of such meetings you have method instead of casualness and you have planning and anticipation instead of post-mortems.

Supervisory staff, and not only the more senior staff, should be given the opportunity of attending external conferences—for example, the Management Conference at Oxford, the Industrial Welfare Society's Conference, and others. Excellent results were obtained by the Foremen's Conferences organised before the war under the auspices of the Industrial Welfare Society. There is a real danger of the lower grades of staff getting into ruts and being allowed to stay there.

CONCLUSION

We are all aware of the great campaign which is being conducted in the war industries at the moment by the Supply Departments in order to keep production at a maximum. I refer to campaigns by means of suitable posters, pamphlets, lecturers from the war fronts and on special jobs, topical films, synchrophone demonstrations, etc. This campaign is directed towards a specific end, but is definitely fulfilling a training and educational function, as it sets out to bring home to everyone in the factory what the Government is trying to accomplish. It stresses the importance of the particular factory's products to the war effort. To my mind the necessity of such training and education cannot finish with the end of the war. Such methods in some form can be applied in peace-time to accomplish many of the things which we are desirous of accomplishing. Some of the methods, of course, are not new and have been used by firms in this country, but they must be more widely and more systematically applied. The synchrophone method of instruction seems to have possibilities of application, especially if the idea develops of having a synchrophone library or central bureau from which units dealing with particular matters can be loaned.

External and internal courses should not be antagonistic, but ought to be complementary. Staff should, if possible, receive their education in management, as distinct from training in management, outside the factory. Inside the factory they should receive training in management, which can only profitably be obtained internally.

TRAINING EXECUTIVES FOR INDUSTRIAL MANAGEMENT

By EDWARD MEIGH, M.B.E., M.Sc., F.S.G.T.
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Training for industrial management at any level is a comparatively new conception. In an age in which adequate training of high standard is taken for granted in the great professions, Law, Medicine and the Church, it may seem strange that Management is a "Tom Tiddler's Ground" for all who choose to occupy it, elbowing their way through, with a remarkable variety of qualifications and disqualifications; no surrounding fence to indicate that only the adequately trained may enter!

The apparent absence of information on training for executive posts within industry is not perhaps surprising; for although we are living in a time when the air is filled with talk and a good deal has been written about the importance of industrial management—the future responsibilities and powers of managers are being portrayed in almost alarming colours—nevertheless we are separated from the throes of the Industrial Revolution by little more than a century. Only three, or at most four, consecutive generations of managers of industry have had the opportunity of considering, had they desired to do so, the question of the appropriate professional qualifications for management, but they troubled not about qualifications and neglected to create professional traditions. Little wonder, then, that the ranks of managers are still largely filled by those who have been born into, accidentally stumbled into, or have boldly pushed themselves into management, and never contemplated being trained for it. In the words of Professor Sargant Florence, "Management was merely an incident, almost a side-line, in the work of those industrialists. To be educated for that side-line was preposterous. You were either born to a great business as the son and heir of a family concern, or you achieved greatness by successful competition against rivals, or you had it thrust upon you by promotion from the ranks of clerks or foremen. You never *trained* for the management of business as you trained for the Law or the Church or Medicine. In short, Management was not a profession."

EARLY TRAINING WITHIN THE FACTORY

Starting from the assumption that there is available human material selected and educated suitably, I shall present in briefest outline courses of training within the factory to prepare newcomers to take a place in the ranks of executives. Later I shall indicate lines on which those who have already climbed the ladder to executive status may profitably continue their training. I have not thought it desirable to spend time over the definition of the

term "Executive" as used in industry, since it is certain that the term will have a somewhat different connotation in different types of organisation. For the purpose of leading the discussion along lines with which I am familiar, I shall assume the term includes the functional head of each Department or Section of an industrial organisation, and sometimes one or more deputies or assistants to that departmental or sectional head. I shall have in mind particularly the main activities involved in the complete process of production, supply and distribution to customers of a commodity made by modern mechanised, or mass production methods. The factory training of personnel to be equipped to undertake the control of these activities should be designed to bring them into intimate contact with each of the elements, material, human or intangible, which make up the complete organisation of the enterprise; and the training should be intelligently supervised by an Executive capable of co-ordinating and presenting as a living whole the various constituents into which the problems of manufacture and supply, human factor, and commercial operation, have been analysed. Certain guiding principles may be discerned as commonly applicable to most of such productive industries. The programme of training for the first year or two should cover the same ground whatever the ultimate functional destination of the candidate, although the pace at which different parts of the ground may be covered may be variable. The process of initiation should be such as to enable a trainee to comprehend the objectives of the enterprise and the relationships of the various personalities concerned in its direction; some idea of the history, the framework and the policy of the Company for the fulfilment of its three-fold responsibility, to the public as consumer, to its workers, and to the shareholders, should be communicated to the trainee, preferably by the supervising executive. In practical terms the trainee should first learn to know intimately the article or the commodity to be supplied to the Company's customers. I attach great importance to this practical starting-point for training, although I am prepared to find in others a preference for a precise logical following of the production flow pattern.

The following arguments may be put forward for preferring to start the training with a study of the article to be made.

Knowledge of the finished product focuses the objective of the manufacturing operations on to the background of the customers' requirements and the *raison d'être* of the industry. By knowledge I mean both familiarity with its finished appearance, including the common manufacturing blemishes or defects, and understanding of its physical properties, its essential qualities, its function, and its design to fulfil that function. The character of the product illuminates many of the underlying reasons for the processes of manufacture, handling and distribution; throws some light on the evolution of the organisation of the operations, and the selection of the labour employed; and supplies a foundation from which the unfolding of the processes of manufacture may be rationally followed. Having

“learned to know” the product, the object of manufacture, in its nascent form and condition, the trainee may then proceed along the production flow pattern to a study of, and participation in, the activities of the various departments, culminating in a comprehensive examination of the design and layout of the factory, of labour and welfare conditions, and so on to explore the range of commercial activities. Pursuing these lines of treatment, I submit the following rough outline programme of training during the first two years :—

TWO-YEAR PROGRAMME OF PRACTICAL TRAINING FOR EXECUTIVES— FIRST YEAR

Period I.—Initiation.

Introduction to Factory and Personnel and discussions on Company's history, objectives, and policy.

Period II.—Inspection Departments.

Routine inspection and sorting to become familiar with the Company's products, normal quality, manufacturing defects and blemishes, and causes of complaints. A study of quality control, sampling, testing, re-sorting.

Period III.—Production Departments.

Raw Materials (including Fuel), transport, unloading, storage, conveying, handling, and treatment.
Production Machinery, processes, and handling equipment, auxiliary processes (e.g. mould, die and tool making).

Period IV.—General Engineering Services.

Electrical equipment and distribution stations, compressed air plant and distribution, steam raising plant and distribution of steam, water supply, wells, softening plant, and water distribution, Maintenance and Repair Departments, e.g., Carpenter Shop, Bricklayers' Shop, Machine Repair Shop, Motor Vehicle Repair Shop.

Period V.—Design, Laboratory and Testing Departments.

Drawing Office.
Machine Design Shops.
Laboratory. Routine Analysis.
Research.
Testing and Calibration.

Period VI.—Warehouse, Stocks and Stores.

Loading and Unloading. Transport and Distribution. Factory Layout and Flow of Production.

Period VII.—Offices.

Works Records.
General Office.
Purchasing Department.
Accounts and Costing.

TWO-YEAR PROGRAMME OF PRACTICAL TRAINING FOR EXECUTIVES— SECOND YEAR

Period I.—Labour Management.

Recruitment of Workers, Conditions of Employment, Welfare, Canteen, First-Aid, Payment of Wages, Social and Club Activities.

Period II.—Sales Department (Head Office).

Sales Contacts. Advertising. Customer distribution and characteristics.

Period III.

Customer Visits with Sales Representatives.

Period IV.

Budgetary Control and Production Planning.

Period V.

Company Structure and Staff Administration.

In considering this programme the following points should be kept in mind :

- (1) The number of days or weeks allotted to each period and sub-period will of course depend largely on (a) the character of the factory and its processes; (b) the previous education or professional training of the trainee; and (c) the department for which he is destined. Too much importance should not, however, be attached to (b) or (c), because there will be opportunity for more highly specialised departmental training in the third and (if necessary) fourth years of training.
- (2) It is advisable that the main periods be so arranged that there may be a convenient and generous break of, say, two weeks between each such period during which time the trainee will write his report, make revisions, have discussions with Executives, and investigate any points which have not been satisfactorily understood.
- (3) The period of training in each department may be sub-divided into periods for :
 - (a) observing, learning and making notes in consultation with foreman or charge hand.
 - (b) performing routine tasks as an ordinary worker in the department.
 - (c) investigating a set problem of special interest.
 - (d) discussing the underlying principles with those members of the management or staff most competent to explain them.
- (4) While all executives and senior staff should be induced and encouraged to interest themselves in the work of the trainee, it should (as already indicated) be the special duty of one executive to act "Godfather."* Thus the trainee may have one unfailing source of help who will assist in unravelling tangles and disposing of difficulties. Clearly a great deal depends upon the enthusiasm, care and intelligence of the "Godfather."

In conjunction with the practical factory training there should be prescribed a course of industrial education to which the trainee should be subject. This course is very highly specialised and must therefore be taken concurrently at the factory. This educational training is not only supplementary to the practical work, but provides points of valuable contact with members of the senior technical staff and higher administrative personnel. It is obviously capable of considerable variation to suit particular conditions, and may be illustrated as follows :

EDUCATIONAL TRAINING CONCURRENTLY WITH THE PROGRAMME OF PRACTICAL TRAINING

I. *Weekly talks by members of scientific staff on such subjects as—*

- (a) Chemical and Physical Properties of the Company's Products and the raw materials used.
- (b) Scientific principles underlying methods of manufacture.
- (c) Methods of Testing.
- (d) Use of statistics in controlling quality.
- (e) Recording and Controlling Instruments.
- (f) Technical Literature relating to Company's processes and products.

* See p. 402.

II. *Occasional talks by Technical and Engineering Staff on such subjects as—*

- (a) Principles of machine operation.
- (b) Mould and tool design.
- (c) Fuel—its applications and economical use.
- (d) Principles of Factory Layout and organisation.
- (e) Complaints and methods of dealing with them.

III. *A series of talks by the Managing Director or Company Secretary on—*

- (a) History and Development of the Industry.
- (b) Relationship of the Company to the Industry.
- (c) Competitors in the Industry.
- (d) Trade Conditions in the Industry.
- (e) Organisations of Manufacturers and Trade Unions affecting the Industry.
- (f) Legislation specially affecting the Industry.

IV. *Attendance at suitable short courses, e.g.—*

- London School of Economics.
- Polytechnics or Technical Schools.
- Lectures of any learned Society associated with the Industry.

V. *Routine Reading.*

- Trade Journals.
- Technical Journals.
- Industrial Welfare Journal.*
- Board of Trade Journal.*
- Ministry of Labour Gazette.*
- Works Reports.
- Reports of Trade Associations.

I should like to emphasise that these suggested programmes of training and education are put forward as a basis for discussion. Far from being able to guarantee results if these lines are followed, I must confess that my experience of applying somewhat similar courses has been disappointing, as judged by the fact that a large proportion of the trainees failed to settle down with the Company after training followed by a period of appointment as a junior executive.

Imperfections in this scheme of training may have contributed to this melancholy result; it is also possible that errors of judgment may have been made in selecting the candidates for training; but I think the real reason is to be found in the great difficulty of grafting new executives on to an existing organisation, especially where the existing executives have not themselves had the advantage of similar systematic training for their posts. Such executives are not inclined to take any real interest in the preparation of trainees. This difficulty is probably intensified where the organisation has developed very rapidly, or contains executives who have been promoted too rapidly. Managements may fail to obtain the confidence of trainees, even when they have subscribed to a paper programme of training, because the Managements themselves have no clear and consistent view of their goal. This is quickly "sensed" during discussions, or from reluctance to engage in discussions. It is not to be expected that 100 per cent. of the candidates trained will become suitably settled in executive appointments, but my experi-

ence suggests that all too frequently failure to retain trainees is not due to the inadequacy of the course of training or an unsuitable personality in the trainee. It is a deep and serious problem of human relationships, probably of human selfishness, and is really outside the scope of a paper dealing with methods of training, but as the result is frustration of the objects of the training this should perhaps be said. Too many of the occupants of executive posts are so jealous of their positions that they not merely fail to co-operate in training assistants and possible successors, but they deliberately frustrate all efforts to provide them with such assistants.

CONTINUANCE OF TRAINING

And now a word about the continuance of training for those executives already established in industry. One of the saddest spectacles is that of the individual who having attained a position of leadership considers himself "finished" with the drudgery of training and education; sad, because in very truth he is finished—and done for! Frequently a man of this type engaged in management so shuns the light that he dislikes having under him those who are eager to continue their training and anxious to keep abreast of new thought and development; they may know too much and make him feel uncomfortable! If management is to adjust itself to the re-birth of education which is impending, continued training of executives will of necessity become a vogue. The form or forms such continued training might profitably take should bear brief consideration.

Routine training and education may be continued in Committee work with other executives provided the work is well planned and seriously undertaken. A weekly or fortnightly meeting of Executives to review the work and discuss difficulties that have arisen may be used to keep up-to-date with developments in the industry, by exchange of information, particularly if one member makes himself specially responsible as a public relations and intelligence officer for garnering the latest pertinent news. A weekly or fortnightly meeting of executives with senior technical staff is frequently adopted with good results, especially in giving exercise in rapid digestion and discussion of reports. A more formal monthly meeting of Executives is helpful when a detailed examination of financial statements and statistics may be combined with a preliminary discussion of many of the matters to come before the Board of Directors. At such conferences executives will find a valuable opportunity for practice in expressing themselves in clear, concise and logical language. This, therefore, provides an excellent training ground.

In addition facilities should regularly be given to executives to continue, or to revise, or undertake further professional training by attendance at meetings of their particular professional Associations, at Conferences, and in some cases at short special University courses. Executives should be encouraged to write papers and participate in the discussions of their professional bodies or learned Societies. The idea of a "Sabbatical year" is now advocated in many quarters

—a year's leave when an executive returns to his University for a refresher course. Another most valuable form of training and education for executives deeply engaged in industry is by visits to similar industrial establishments in foreign countries. Time spent in travelling abroad on such visits pays a handsome dividend in the new life, increased vigour, and broadened outlook brought to the executive fortunate enough to enjoy such experiences.

Similarly, close contact with other executives in the same industry at home, particularly participation in the work of Manufacturers' Associations or Federations, Joint Industrial Councils and the like, confers a freshness of perspective and a realisation that there constantly exists in industrial activity something worth striving for, a vital contribution to the national life. Another important direction in which executives should continue the discipline of education and training is by systematic reading of the literature which bears on their work, not merely the current trade periodicals and technical journals produced both at home and abroad, but also the more forbidding publications such as those of the various Government Departments, including especially those known as "S.R. and O" and at present issued by the hundred. Although it may be dreary work concentrating on these orders and regulations no executive can afford not to know what is in them when they affect his industry. Ignorance, which is "no excuse," may lead to serious embarrassments.

Having expressed my belief in systematic training for Industrial Management at the highest level, and having indicated a programme which may be found useful for certain types of organisation, I should like to plead for a frank and widespread interchange of views and experiences on this important subject so that a body of facts may become available.

Most of the troubles of Industry are probably due to deficient fact-finding; at least I am convinced that many of the blunders made in determining policy and in dealing with difficulties are due to inability or incapacity for establishing the facts of the situation or to decisions made in the absence of the pertinent facts. Therefore, exchange of information, of carefully ascertained facts would be the most valuable foundation for evolving principles upon which the future training for management may be confidently based.

THE PROBLEM OF SUCCESSION

To the normal mind it would seem rational to have possible successors coming along at intervals of about ten years, certainly not more than fifteen years, to fill all executive posts, but one finds an extreme unwillingness in many executives to contemplate even such a reasonable provision of continuity of management. They prefer to monopolise every detail of their job to the bitter end, and allow the future to take care of itself.

The explanation is probably partly inferiority complex, and partly inability to delegate responsibility. Any scheme of training should take this into account, but the traditions of British Industry

contribute to the difficulty; it has been regarded as good business to be able to run an organisation with the fewest possible high-salaried executives. Compare similar industries in the United States of America and in Britain, and it will be apparent that the number of executives per unit of output is much, very much, higher in the United States of America, and yet usually greater prosperity is the result.

There is much more room at the top in British Industry, and if properly selected, educated, and trained executives were allowed to occupy the upper floors I firmly believe that vast expansion and increased prosperity would result.

CONCLUSIONS

In conclusion, I also plead that schemes of training shall be so thoroughly worked out and be of such quality that their wide adoption will inevitably lead to the universal recognition of Management as a Profession.

In regard to the small firms, possibly the solution will be found in training executives for an industry, rather than for a particular firm. I have experienced one outstanding case of success where the candidate was trained in one of the works of a company, and after training looked like failing to be grafted on to the executive personnel, but when transferred to another factory of the same company, he soon established himself very satisfactorily.

To sum up, I believe that failure to train executives adequately for industry is due mainly to the old bugbear of human selfishness, and we must persist in an upward struggle until the necessity for training is accepted generally.

Mary Follet¹⁸ has well claimed that management can no longer be sustained by "exploiting your personality" or on the strength of "ascendancy traits"—"The leadership of function is more important than the leadership of personality—to allow the men with the knowledge and technique to control the situation."

Only by the establishment of a high standard of scientific and practical training, based on methods generally agreed after adequate experience, can we hope to enter an industrial era in which Management will become one of the Professions.* "Profession" (again in the words of Mary Follett) connotes a "foundation of science and a motive of service." This motive will surely call and move many candidates to undergo the discipline of training for industrial leadership, which will have an outstanding mission after the Victory in nurturing and uplifting our national standard of life.

The time is ripe for all those who may have a contribution, however small, to make to the establishment of sound schemes of training to venture forth together to achieve the building of a worthy industrial edifice. The auspices of the Institute of Industrial Administration are available for the growth and development of training schemes, the study of their efficiency, and the interchange of experiences in their application. The Institute is itself the embodi-

* See p. 370.

ment of the new age of industrial management and is even now experiencing an upward surge from the rising flood of professional consciousness amongst the new generation of management.

With high moral principles and irreproachable ethical code the management profession is destined to be established on a foundation of science, a structure of training and a motive of service. It is a venture of faith. "The steps of faith fall on the seeming void but find the rock beneath."

TRAINING FOR THE BOARD ROOM

By DONALD McDONALD, B.Sc., F.R.I.C., M.I.Chem.E.

(Fellow. Joint Managing Director, Johnson, Matthey & Co., Ltd.)

In approaching this subject it is necessary for us first of all to note a number of changes that have taken place in the make-up of industrial organisation during recent years. Owing to the infrequency of discussion about the principles underlying its supreme direction, there is a good deal of danger that the effects of these changes may be overlooked. I propose, therefore, very briefly to explore this aspect before establishing who it is that is to be trained for the Board Room and for what purpose.

NEW FACTORS

The first new factor is the rise of Management as a profession and a separate entity in the industrial system. This rise has coincided with the tendency on the part of the representatives of Capital and other interests to withdraw to some extent from Management in favour of the new element and to confine themselves to the direction of policy, delegating to an executive person or body the responsibility of carrying it out to their satisfaction.

The second new factor is the rise of Labour and its aspirations to become a partner in industry. This has had the effect of making the human element even more vital on the production side than it was a century ago before it was displaced from that position by science and machines. This state of affairs has been given even more prominence by the war-time achievement of full employment.

The third factor is that the rapid progress of scientific discovery and its technical applications has made both Management and Labour more important factors in business than ever before, and has made managing direction to an increasing extent a matter of directing the specialists, the experts and the skilled.

THE PROBLEM

The Board of Directors to-day, in exercising its dual function of shaping policy and directing its execution, faces in both directions situations much more complex than those of a generation ago, and this has strengthened the tendency to delegate the executive

function to committees or individuals who are, or are thought to be, specially qualified to handle it. It is with the training of these latter people that I propose to deal to-day, and I shall have particularly in mind their position in those smaller organisations that make up such a large majority of British industrial concerns. In these, although their primary function is executive, they must also take a full part in the formation of the policy that they execute. What I have to say, therefore, will doubtless apply very little to those great comprehensive associations in which the policy-forming body is very much less intimately connected with the execution of its policy and with the great body of those executing it. It will also have little reference to purely commercial, as distinct from industrial, concerns. I shall leave those fields to other hands.

Having decided upon the kind of persons whose training we are going to investigate, let us now ask ourselves what we mean by "training." This, in my view and in this connection, consists of two parts, education and experience. The function of the education must be as much to prepare the candidate to get the fullest possible benefit from the experience as to give him the special and general factual knowledge necessary for his career. The experience he will largely seek himself, and one of the objects of training must be to see that he has full opportunities to get it. If, given those opportunities, he does not seek it, then he is not the man we want.

SELECTION

The next question is where these Managing Directors are to come from. Are they to be recruited from among the general body of management within their Companies, or do they form a separate *corps d'élite* specially prepared outside for such work and leaping into the business like Pallas Athenæ fully armed from the brain of Jove? At this stage let us take a look at the past. The latter state of affairs for a long time actually existed and Boards were normally recruited from among special people. Usually these were the sons, relatives and friends of the other members, and their abilities and personal qualifications were, or were supposed to be, well known, or they were educated for the purpose. I shall deal with this education later and, where it applied, it was followed by apprenticeship in the business and fairly rapid accession to the Board. The other members were brought in for a great variety of purposes, such as, for example, the possession of capital or special knowledge or goodwill, because a successful career elsewhere indicated that they possessed ability, or for other reasons, in many of which we need not seek instruction. It was, however, in those days comparatively rare for a member of what to-day would be called the Staff to join the Board. The frequency of such an occurrence is now greater for reasons which I hope to make clear in the course of my paper.

It is my own opinion that, provided people can be found within the organisation with the necessary personal qualities and character, there are many good reasons why they should be given preference over outside candidates in the absence of any cogent reason to the

contrary. The inside men are, or should be, thoroughly familiar with all the details of the business and its markets, and with the personalities and abilities of their colleagues. Their own qualities are equally well known to the Board and can have been the subject of study and development over a long period. On the other hand, however complete an enquiry is made about the candidate from outside, there will always be a doubt about his ability until it is proved, and about whether he can settle down and be accepted by the other members of the organisation. As for his technical knowledge of the business and its relations, that must necessarily be small, and the effect of the introduction of a stranger on the morale of the establishment is bound to be considerable. But at the same time it must be very definitely and firmly laid down that no derogation can be permitted from the high standard of ability and character demanded of holders of the highest offices. If such people do not exist within the organisation, and by the very nature of things they will be in any case very few, then they must be sought elsewhere. All the disadvantages of this latter procedure will therefore be avoided if the staff of the Company has been consciously built up to yield men of the right calibre and these have been encouraged and helped to educate themselves for higher things. This is the problem which I want to discuss, and I shall not deal at all with the training of a *corps d'élite* outside.

QUALITIES

Having got so far, let us ask ourselves what the qualities are that we seek in a potential Managing Director. There is the power of leadership and the gift of enterprise; the character that commands respect; the wide experience and knowledge of human nature; the courageous imaginative and experimenting mind; the power quickly to analyse situations and reject the unessential; and the necessary equipment of technical and commercial knowledge. Many people have drawn up such lists. They grow longer and longer until they take on the outlines of a specification for Superman himself. I am not going to add to them any further but leave you to continue for yourselves, except for a passing recommendation to your notice of the one drawn up by the powerful combination of Field Marshal Wavell and Socrates.* But what is certain is that their contents fall into three classes. First there are natural faculties which can be exercised and made more supple but not implanted; then there is character, which can be built up and developed but only on the foundation of what is already there; and, lastly, there is knowledge, which can be imparted to those minds that are able to receive and use it. So the problem before us in training for the Board Room

* "The general must know how to get his men their rations and every other kind of stores needed for war. He must have imagination to originate plans, practical sense and energy to carry them through. He must be observant, untiring, shrewd; kindly and cruel; simple and crafty; a watchman and a robber; lavish and miserly; generous and stingy; rash and conservative. All these and many other qualities, natural and acquired, he must have. He should also, as a matter of course, know his tactics; for a disorderly mob is no more an army than a heap of building materials is a house."—Quoted in *Generals and Generalship*.

is first to find the persons having the requisite fundamental faculties, character and mind, and then to seek to exercise the first, develop the second, and impart knowledge to the third. So I have at last reached what Euclid called the Enunciation of my problem.

BASIC EDUCATION

Before proceeding with the Construction, I suggest that we should take a glance back into the Victorian past in order to see if there are any lessons to be learnt there from the type of education which was given then to any young people destined for high business office. It was an education at the Public Schools designed to open up the faculties and develop the character rather than to feed the mind with specialised knowledge. Further development was sought in perhaps a University degree in the Humanities, travel abroad and a few years' experience in the routine of the business. The primary education did provide a useful window on to human behaviour in its stress on the importance of history and the Classics. History is a pageant of human reactions to events under conditions which the historian sets out fully for our benefit. Much of it is no doubt of the past and out of date, but the character of man has changed little during the historical period, and we can still learn from the story of his confrontation of his fate as unfolded in the pages of history. Even more is this true of the Classics. The philosophers of Ancient Greece and Rome had time to sit down to ponder over the oddities of human character, and while his institutions have changed, man has not, and much that Plato and Aristotle have to say about it was still good for the Victorians and is still good to-day. We have no time in these days to sit down and do what they did for us, which is to give us a picture of human character and a way of life of which the lessons are very far from being exhausted. The learning of the old languages, too, not only gave them access to the minds and manners of the ancients, but was in itself a valuable form of mental exercise. The mastering of a highly inflected and expressive language can be a great mental stimulant, as those who have found it necessary to learn Russian have found out. Another fact which had a great influence, often not sufficiently recognised, is the extent to which the Victorians were affected by being brought up in a more or less enforced familiarity with the Bible. This probably did them some ethical good, but undoubtedly kept before them a pageant of human conduct which could not have been without its effect on their reactions to life.

All this prepared them to be receptive to experience, to interpret and to profit by it, while a sound knowledge of their fellow human beings helped them to the foresight necessary to apply its lessons. Both in their markets and in their factories the human element was predominant, and without any doubt the shape of their education helped them to cope with the many problems that confronted them.

But as industry spread and grew and mechanised itself more and more, the old education seemed to be all wrong. The Classics and the dead languages were thrown out, not only for those technically

employed, but for all, and the physical sciences and engineering came in to take their place. It looked as though man was no longer important in production but only the machine, and for many years no one doubted that philosophy. It is the War and full employment that have to some extent reversed it and led to the discovery that after all it is man that must work the machine and supervise the processes, and that, having acquired education and organisation, he is insisting upon his interests being considered. So a feeling has grown up that the Classics and the Humanities might not be so far out of touch with modern affairs as we had thought, and it is noteworthy that quite recently two officers of Engineering Institutions have allowed their thoughts to run that way in public addresses. Professor C. E. Inglis, President of the Institution of Civil Engineers, in an address in 1941, said, "For men destined to hold positions of high and varied responsibility—education in the broadest and most liberal interpretation of the term is required." In the same year Mr. John Terrace of the Institution of Gas Engineers said that the chief official of a business should be educated in the most liberal sense so that he may develop the ability to acquire at will the kind of knowledge found later to be necessary. This latter statement is a plain echo of Thomas Arnold's remark of about a century earlier: "I am increasingly convinced that it is not knowledge but the means of gaining knowledge which I have to teach."

So much for the past and, putting its lessons at the back of our minds, let us return to the question of training our embryo Managing Directors. I have suggested that they might be sought within the Company's ranks and their capabilities consciously developed there. The great potential disadvantage of this system is that the people in question may not be able to keep in touch with developments outside or to become acquainted with technical and other progress. The great merits of "new blood" are that it can at least bring in new knowledge and a new outlook, and it is considered to be the property of new brooms always to sweep clean. If the access to new blood is going to be restricted, then steps must be taken to ensure that growth, development, and familiarity with outside progress are encouraged to a maximum among the insiders. This is a direction in which the question of education to which we are giving our attention is of the greatest importance.

Another very important thing about this education of people for the highest offices is that it must never cease until the day of final retirement. Whatever they have learnt in younger days at once begins to become out-of-date unless it is continually renewed and added to. The world of knowledge and experience develops at an ever-increasing speed, and the high executives must keep pace with it, for immediately they begin to fall behind they cease to be masters of their jobs. These men have very heavy responsibilities. They are responsible for great quantities of invested capital which, although it may be privately owned, is the means for the earning of the national income on the amount of which depends the standard

of life of the nation. Further, they are responsible for the livelihood and well-being of great masses of the ordinary working people, who have invested their lives in industry, and in most cases have no capital, profession, or skill at their backs if industry lets them down. Also, in large numbers, the youth of the people commits itself into their hands and to that extent the shaping of the nation of to-morrow is in their keeping. Finally, they are responsible to a major extent for the flow of trade which is the life blood of the community. These are great responsibilities in face of the nation, and those who accept them must fit themselves for them, particularly for the times of great opportunity that will be before us at the end of the War. As for those who want the purple of office without the burdens of responsibility or preparation, they had better remain where they are.

The beginning of the preparation is in the primary and secondary education of the candidate, which is assumed to continue to the age of about 18. It has been suggested that "Management Subjects" might be included in the curricula of sixth forms at schools. I regard this as utterly wrong. The business of schooling is to give the schoolboy and the student a wide basis on which to build, an eagerness to do that building and a discriminating knowledge of what to build with and where and how to get it. The older type of school education, I think, did that better than the new, except perhaps where the latter is in the hands of individual headmasters bold and energetic enough to avoid the dead hand of the examination syllabus. Far too much premature specialism takes place already, based on the mistaken idea that education ends with school days, and therefore that the more is crammed into the latter the better. I believe that principle to be fundamentally wrong, and, with Sir Richard Livingstone, hold that education is a process that must go on into and through later life, and only bears its finest fruits when it is cross-fertilised by actual experience of the living outer world.

Some years ago there was great debate on the place of the University graduate in business, reference being made to a youth who has taken a degree after three or four years as a whole-time student at a University after his schooldays and before entering a firm. If the degree is a scientific one and is a prelude to a technical career in the laboratory or in production, there is a great deal to be said for this, especially if research is contemplated. But before entry into commerce, administration or management, with a hope of advancement to high office, the value is nowadays doubtful. The student is removed from contact with business life and segregated in a placid and pleasant backwater during his most receptive years. In the more leisurely days of the past that did not matter, and the gains outweighed the loss. But to-day life moves too swiftly, and the handicap of those lost years is very difficult to make up. The period is too long and at the wrong stage in life. That the course can confer very great benefits there can be no doubt, but (in a candidate for business) it should not be divorced from business and commercial life.

This latter still has a great deal of the primitive about it when contrasted with ordinary University life, and somehow the two should be sandwiched. The present part-time system of working by day and learning by night or in the week-end is not very good beyond the age of, say, 25. Up to that age it can be used without harm to obtain the ordinary business or technical qualifications together with admission to a professional body. After that, the physical and mental burden becomes too great, and in addition there is a complete absence of special atmosphere and community life necessary for any wider education in the humanities. One must hope that the Universities will forget ancient habits and set up residential courses in such subjects of not more than, say, six months' duration especially for candidates seconded from industry, in the manner of the Scandinavian High Schools, perhaps by means of some University Extension system domiciled in country houses. In my opinion, it is better for industry to take its recruits destined to be candidates for high management straight from school, and to release them later for three- or six-monthly courses from time to time, so that they have these intervals for thought and study sandwiched among their work.

TRAINEE DEVELOPMENT

It is vitally necessary that the young candidate for high office be encouraged to study the workings of the human mind at first hand. The infant science of psychology has already a great deal to tell, but cannot yet, if ever, take the place of study by direct contact. Such contact must be particularly sought with the minds of the working people. Labour is now a partner in industry, and its feelings and aspirations and sensibilities must be understood by those who hope to manage its activities. While it is fully vocal in political and economic directions, as yet it finds great difficulty in voicing things less ponderable, and these have to be sought out and brought to light by sympathy and understanding. In the same way, with the reverse process, it is not always easy to convey shades of meaning to the ordinary working man and woman. Their treatment in the past by management has not always been wise, and a good deal of suspicion still exists. They wonder about motives, and if there is a wrong end of the stick it is that that is grabbed at. So let our young friend make contact, with sympathy and an entirely open mind. Let him take part in the workpeoples' activities, whether social or benevolent, arts or sports. Let him seek and take office, and by working energetically and for nothing for the good of others learn the discipline and happiness of service to those less well endowed than himself. Let him seek for confidence and trust and a community of point of view. His experiences will continue later in Works Committees and Joint Production Councils, where he will have another opportunity for further studies under rather different conditions. All this is a really vital part of the education of a Managing Director-to-be. In the last two generations so much time and energy has been wasted through the taking up of sides and

attitudes largely based on want of understanding. The gap that at one time yawned so wide between capital and labour and was so difficult to bridge must not be allowed to open between management and labour, or, for that matter, between management and capital. But this latter is a far easier question.

Next our candidate must learn and practise the art of self-expression, both through the written word and in speech, private and public. So much of this world's misunderstanding and friction can be avoided if people will only learn to say and write down what they mean in clear, simple English words. Yet how uncommon is this gift, and how little is its importance emphasised, not only in the schools, but also by those who advise us in later life.

Next there is a subject on which there ought to be a course in every University in the country, and that is expressed by the useful, if rather ugly, name "debunking." The high executive must be able to strip reports and statements made to him of all unessentials and inflation; to allow for the blinkers occasionally worn by the specialist; and to recognise and discount all propaganda, whether personal, salesman's, departmental, professional, institutional, class, political, ideological, or fifth column. He may then perhaps be able, as near instantaneously as possible, to precipitate the modicum of absolute truth that is usually present in the volume of material that comes before him. The Americans, with their quicker reaction, or perhaps because of their thinner load of tradition, have realised the need to deal with this last problem, and a large number of their schools and universities are co-operating successfully with an educational enterprise called "The Institute for Propaganda Analysis," and when a similar movement for the decontamination of information arises in this country, it will provide an essential element in the training of the candidate for high business office.

I have already discussed a little the question as to whether these people should come from inside or outside the organisation, and have indicated my belief that, if overriding questions of policy are not in question, the former is fully possible if people with suitable characters and qualities can be found. I assume, of course, that as they work their way up in the business they will acquire the necessary technical and commercial knowledge, and that they will go through what we call the Fundamentals of Industrial Administration, and much of the training which has been so well and carefully dealt with in the earlier papers before this Conference. They should also, if possible, go "on the road" for a time. But not only have they to be trained and developed, but they must be prevented from getting into ruts, and must be kept up to date with developments both inside and outside the organisation. Some of them may be lucky enough to occupy positions which enable them naturally to take a wide view and to acquire varied experience both of people and things in the course of their everyday duties, but inevitably others will be cabined in departments. The danger in these latter cases of a narrowing of interests and a limitation of outlook to a strictly parochial one is great, and definite steps must be taken to counteract these influences.

The Industrial Staff College * is a conception which has been often talked about, and one or two experiments in this direction were actually set on foot before the outbreak of war. It seems to be very necessary that this matter should be pursued to a conclusion and suitably staffed colleges set up all over the country to which industry could send its budding leaders for courses in the general functions of management. Further, there would be refresher courses for the established. The normal length would be perhaps a month or two at a time, but no doubt those who have given more thought to the subject than I already have their own ideas about this. These courses would not interfere with those in the humanities at the Universities, which have been mentioned earlier in this paper.

Failing, or in addition to, Staff Colleges, arrangements could perhaps be made mutually among friendly and allied firms at home and abroad for temporary exchanges of higher staff men for educational and mind-broadening purposes, or the same sort of thing is perhaps conceivable between firms interested in forms of manufacture so widely different that questions of leakage of confidential information about markets or processes are reduced to something very small. Obviously in the present state of human nature such exchanges would not be practicable among firms competing in the same or closely related fields. It should also be carefully considered whether such men could not be given spells in departments and branches other than their own within the one organisation and, above all, all of them should be encouraged to read and mix.

This encouragement of openness of mind among a Company's rising staff will help to ease the problems of the existing managing direction. It will be the aim of the latter, while leading and shaping the activities of its subordinates towards the ends designated by the Board's policy, to avoid blunting in any way, indeed to do its utmost to encourage, the initiative and enterprise of the individual. He must be brought to believe always that his function is part of a whole, and that, while retaining and exercising his full individuality, he must mould or shape it so as to fit in, or allow itself to be fitted into, the pattern of the major policy or plan. As Mary Parker Follet¹⁸ put it so long ago as 1932 :

“ We can never reconcile planning and individualism until we understand individualism, not as an apartness from the whole, but as a contribution to the whole.”

This view should also play a part in the attitude of the high executive to any direction on the national plane to which industry may be called upon to submit in the future.

Finally, of course, there must be a certain number of subjects which the candidate for high office will meet with full impact for the first time when he enters the Board room. Finance will assume an entirely different aspect, and its dependence in these days on the economics of currency, credit, price level, exchange, and the terms of trade, open new fields in which he must find his way. Unless he has

* See p. 360.

graduated in the accountant's office, the terrors of taxation law will be fresh to him and he will find behind them another new world. Naturally, there will be many other directions in which the aspect of things is very different from that to which he has been used.

So far, I have referred to the candidates for high office in the masculine gender. I have done this solely to avoid the continual clumsiness of "he or she." I see no reason, and certainly have no wish to express one, why women should not aspire to these offices that we have been discussing, provided, of course, that those are found possessing the requisite qualities. A relatively few are already occupying them, and with success. Many of you will not need reminding that there is at least one company in this country, with a name that is very literally a household word, which is presided over, as chairman, by a distinguished lady.

I want just to take a cursory glance at one or two suggestions of specific means of training for the Board that have been made and to some extent explored.

The first is the "understudy" method, by which the candidate becomes the confidential assistant of an existing director. Whether this is a success or not must depend largely on the personality and ideas of the latter, but it seems to me that there is a danger that the outlook of the understudy may be narrowed. The young man is cut away from free direct contact with the minds of his colleagues and of labour by a premature promotion into a sphere which cannot help but be different from theirs. I have no criticism of this method if it is confined to the last six months or year before the actual taking of office, but for longer than that I do not like it.

Then there is the device of the Junior Executives' Board, which has attracted some attention of recent years through the work of Mr. Charles P. McCormick,⁵⁴ President of the well-known firm of McCormick and Company, of Baltimore, U.S.A. This Board dates from 1932, and is composed of junior assistant department managers and others who have been taking a special interest in their work. It meets monthly, and deals freely with problems submitted to it by the Board of the Company, by the departmental managers, and of its own finding. It has no executive power, but acts by submission to the Board of Directors, with whom it sits in joint session monthly, with the chairman of the Junior Board presiding. Most of the suggestions of the Junior Board have been adopted. A number of its members, averaging in the first few years one man a year, have been advanced to the Board of Directors of the Company. From the personnel of the Junior Board some of its members are recruited also to the high management of departments and functions. A very suggestive feature of the system is that by which individual members of the Junior Board become sponsors* of promising new entrants into the business, for the purpose of observing and guiding them and with a view to leading them in their turn to qualify for membership of the Junior Board. There is also a Sales Executives' Board which meets once in every six months, and a Factory Executives'

* See p. 388.

Board, which meets four times each month, is recruited from foremen and heads of departments (excluding members of the Junior Executives' Board) and acts by submission except in minor matters. The Boards of Executives are self-governing, and election to them is by ballot. No member of one Board may be a member of another, but the meetings of each Board are attended by non-voting members of other Boards. Informal meetings take place weekly between the Board of Directors, the Junior Executives' Board, and the Factory Executives' Board. These meetings enable the various Boards to keep in close touch, and to integrate their activities without undue overlapping; also the higher management can give in confidence early and informal indication of proposed changes and obtain valuable reactions. The scheme certainly has some features that recommend it for study. It does give rising executives an opportunity to appreciate that whole to which their parts must contribute; it allows them to express their views in the highest quarters; it enables them to widen their experience; it enables the Senior Board to see what they make of unaccustomed problems; and the Sponsorship scheme enables all these things to be done for the new entrant. For fuller details the enquirer is referred to the book *Multiple Management*.⁵⁴

The only other training method that I have time to refer to is the "Case" system, in which intricate problems of the higher management are devised by ingenious persons to be solved, or at least discussed, by the student. It is a very useful mental exercise, but I usually feel, as I look at the nicely cut and dried and docketed solutions, that there is nothing in them to allow for the continuous perversity of man and the elements nor for the very frequent perversity of inanimate matter. As long as these factors are never forgotten, the cases have a great deal of usefulness in connection with our present study.

CONCLUSION

Let me now sum up the situation as I see it. A Managing Director must obviously be a master of all the aspects of his business. I have suggested that such mastery can normally be better attained through a career inside the business than through moving about from one business to another outside it. I have stressed the dangers that arise of isolation and in-breeding, and have indicated means by which these influences may be counteracted. I have emphasised the vital importance of certain mental qualities and have urged that methods of education and training should be such as to develop those qualities. Also that it is essential that this education goes on throughout life. This wide mental equipment is required to ensure the proper interpretation of experience and to cope with the permanent importance of the human element in markets and the reappearance of it in production. Further, experience must not be waited for but must be sought out by energetic enquiry, development and research, and humanity must be studied at the fountain-head. I have also suggested that we still have much to learn from the old classic philosophers.

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